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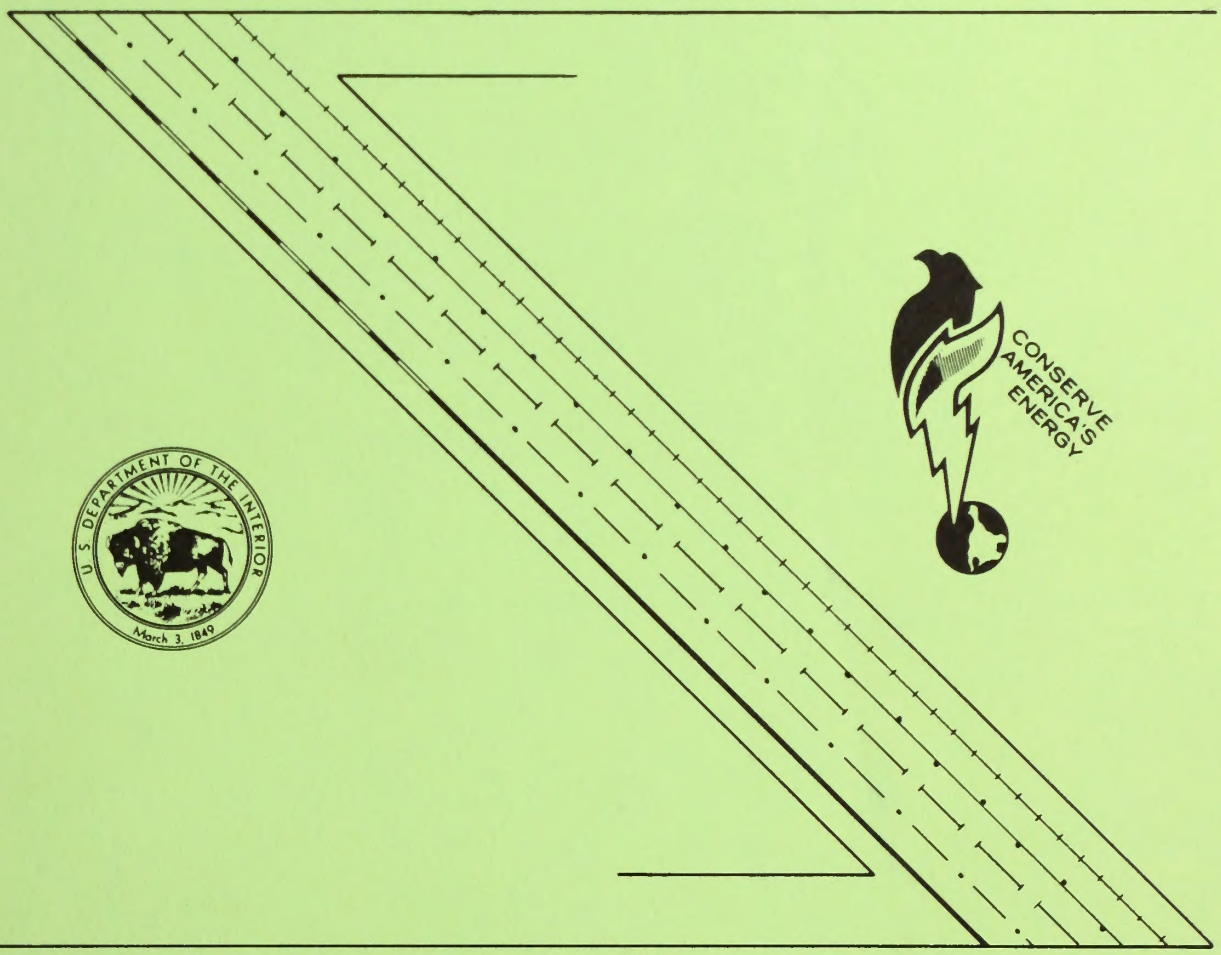

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Transportation and Utility Corridor Feasibility in the Eastern United States with Special Emphasis on the Eastern National Forest System Administered by the Forest Service, U. S. Department of Agriculture

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Prepared for
Bureau of Land Management
U. S. Department of Interior
by Environmental Analysis Systems
(Under Contract No. 08550-CT5-15)

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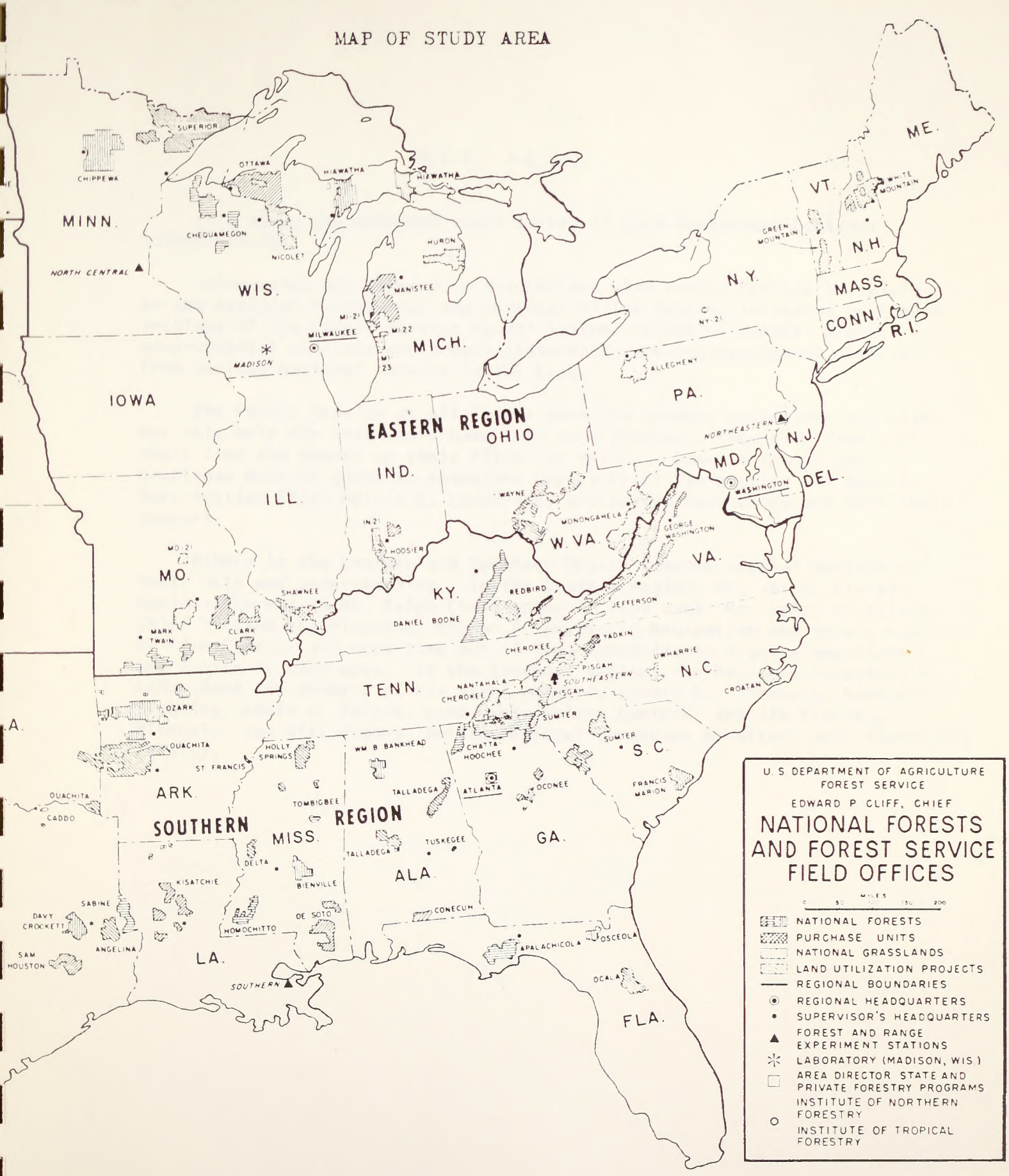

MARCH 1969

P R E F A C E

This study was prepared under Bureau of Land Management Contract #08550-CT5-15.

Information was secured by discussions with Forest Service officials at the National Headquarter and Regional Office levels; reviewing pertinent sections of the Forest Service Manual System; review of guides, plans, environmental analysis and impact statements; and correspondence received from various National Forests in the East.

The Forest Service at all levels gave the outmost assistance and without this help the task would have been much greater. They gave freely of their time and opened up their files for review. Special thanks and gratitude must be given to Associate Deputy Chief Ray Housley and Special Uses Section Chief Melvin E. Loveridge, who opened many doors and lent their support.

Others in the Eastern and Southern Region deserve special mention for their help and understanding. In the Eastern Region, Mr. Jay H. Cravens, Regional Forester, Mr. Ralph Christopher in land uses, Mr. LeRoy K. Kelley, Chief of Land Use Planning, Norman P. Weedon in Recreation and Hoot Gibson of Fire Control all took time out of busy schedules to discuss questions and assist in many ways. In the Southern Region, the Regional Forester, F. LeRoy Bond and members of his staff noteably Edward G. Ellenburg, Land Use Planning; Lewis J. Zolnik, Land Uses; Walter Lewiecki and Jim Stanley, Minerals; and Bill Hughes, Acting Regional Landscape Architect were especially helpful.

Summary and Scope of the Study

The study area of this report covered all lands approximately east of the 100th Meridian, with special emphasis on the Eastern National Forests administered by the Forest Service, U. S. Department of Agriculture. There are 40 National Forests, 26 purchase units, 12 land utilization projects, 17 research and experimental areas, and 12 unclassified management units within the study area comprising 23,748,329 net acres within the administrative boundaries. In addition, within the National Forests and other units, there are 22,797,393 acres in other than Federal holdings.

The Forest Service administered lands are generally in the remote and mountainous areas of the East. Much of this land, when purchased, was in a very unproductive condition consisting of "cut out" forest and abandoned farm lands. Since these lands have been under the jurisdiction of the Forest Service, they are becoming productive and have created increased water supplies, wildlife habitat, recreation opportunities, and an increased timber inventory.

The demand and need for utility and transportation system rights-of-way within these lands has not been great, primarily due to their isolation, size, and geography. The existing right-of-way systems are, for the most part, well planned, but the location normally is subservient to the overall Forest Service policy and direction. Forest Service goals provide for the greatest possible production of goods and services of the renewable resources such as timber, grass, wildlife, recreation and water.

The present right-of-way system will serve as a basis for future multi-use corridor systems. The Forest Service in their planning and analysis process has taken every opportunity to develop such a system. Often this planning objective was reached only after a great amount of time spent in negotiations with the developer. The Forest Service has lost a few of these and the facility subsequent was located on the right-of-way selected by the proponent, but for the most part, the Forest Service has been successful. The one element found to be overlooked was the apparent lack of including other ownerships in their analysis and decisions.

After a thorough review of all available elements involved, it is concluded that a pre-planned corridor system is not needed or is it a desirable approach to land conservation related to the expanding development of transportation and utility systems.

Glossary of Terms

Cooperative Agreement - A document used to provide a defined relationship between the Forest Service and a forest user. The agreement can include monies to be deposited by the forest user to be expanded by the Forest Service to fulfill all or parts of the agreement.

Corridor - A strip of land or land allocation forming a passage way for any one or a combination of transportation or utility facilities or for related pusposes. No width limitation.

Common Corridor - Two or more transportation or utility facilities occupying a single corridor of an undefined width.

Compound Corridors - Two or more transportation or utility facilities occupying a corridor of defined width.

Conceptual Corridors - Undefined area of land created by land use planning in which utility and transportation development is an acceptable use. These broad corridors may be any width and are dependent on the width of the planning unit. Connected planning units which allow the development of transportation and utility systems constitute a continuing corridor.

Planning Corridors - Strip of land having a defined boundary limit not exceeding six miles in width or a minimum width of 2,000 feet depending on circumstances. The strips of land are associated with the planning phase of transportation or utility system development. Generally, they are used to environmentally evaluate the most acceptable broad positioning for development from several alternatives within a conceptual corridor, and as a basic land use area for subsequent development of these systems. Termini of projects should be established before these corridors may be established.

Design Corridors - A strip of land within a planning corridor on which the engineered route of the project is located. Location is selected from a number of alternatives within the planning corridor and is based on a multitude of design and micro-environmental factors. Seldom will these corridors be greater than 1,000 feet wide and in most cases much narrower, about 300-400 feet for multi-use corridors. Several design corridors may be located in a planning corridor, but when this occurs separation between these corridors normally will be at least one mile.

Multi-use corridors - Design corridors containing two or more systems or facilities. See compound and common corridors.

Multi-system corridors - Compound corridors containing two or more types of facilities.

Simple Corridors - Only one transportation or utility facility occupying a corridor of defined width.

Single System Corridors - Compound corridors containing only one type of facility.

Single Use Corridors - Design corridors containing only one system. See simple corridor.

Dispersed Recreation - Recreational use of trails, natural lakes, ponds, rivers, streams, and generally undeveloped areas.

Fee Right-of-Way - Rights-of-way owned by the user as opposed to easements, licenses or other grants from a second party.

Forest Service Manual - The set of books containing the objectives policies and other information which gives guidance to management and administration of Forest Service administered lands.

Forest Service Planning System

Area Guides - Provides broad objectives, policy and direction to be followed by administrative units within a broad planning area.

Forest Plan - Provides the coordinating requirements covering a National Forest's role in relation to the area guide provisions.

Unit Plans - A program developed to provide the greatest output of goods and services within an area which are characterized by particular patterns of geography, climate, resources, and land use.

Forest Service Permits

Annual Permits - Revocable instruments or licenses to occupy Forest Service administered lands.

Term Permits - Instruments granting easement rights for a period of up to 30 years for the occupancy of Forest Service administered lands.

Right-of-Way - A strip of land over which a transportation on utility system is built. See Simple Corridors. In a legal sense, a right-of-way is the right to pass over the land of another.

Special Areas

Experimental Forests - Units of National Forest lands set aside for experimental purposes.

Research Natural Areas - Areas in a pristine condition set aside to study a particular ecological situation.

Wilderness System - Bodies of land set designated or being studied for

classification under the Wilderness Act which are in natural or near natural condition.

Travel Influence Zone - The area adjacent to selected highways, roads, and trails subject to special management measures to maintain or improve aesthetic quality for the traveler.

Withdrawals - A device authorized by law or regulation to set aside areas for specific purpose management. All other management taken place in a withdrawn area is subordinate to the purpose of the withdrawal.

Systems Classification

Buried Systems - Facilities placed beneath the surface of the ground.

Surface Systems - Facilities placed upon the surface of the ground.

Aerial Systems - Facilities supported by structures.

Introduction

To better understand the analysis presented in this report, it is first beneficial to look at the formation of the national forest system in the Eastern United States. For the most part, these lands were acquired under the Act of March 1, 1911 (Weeks Act). This Act provides for the purchase of lands at the headwaters of navigable streams. This Act was broadened by the Clark-McNavy Act of June 7, 1924, which authorized the purchase of lands chiefly valuable for timber production. These combined Acts required that the created national forests be managed and administered under the same policies and authorities as other national forests reserved from the Public Domain.

Subsequent laws enabled the Forest Service to authorize the expenditure of funds other than that authorized by the "Weeks Act authority." The Land and Water Conservation Act of 1965, which provided for the purchase of lands with recreation value, has been a principal contributor of funds to the acquisition of lands under this arrangement. Since lands purchased under this Act must qualify under Weeks law requirements, the lands so acquired come under the same policies and authorities as other national forest lands.

The resultant land patterns from these purchases vary greatly from the contiguous reserved public domain forests in the West. The eastern forests, for the most part, have a checkerboard ownership pattern, with varying amounts of Federal lands within the proclaimed boundaries. The ratio of non-Federal to Federal lands is seldom greater than 1:1, or 50 percent Federal ownership and, for the most part, is somewhat less, such as in Ohio where only approximately 19 percent is in Federal ownership, or a 5:1 ratio. This fact has a marked affect on planning and management. Of equal importance is the location of these forests. For the most part, they are in the mountains and upland areas representing enclaves or islands in a larger land ownership mass.

The lack of contiguous ownership patterns, both internally and externally (as represented by national forest isolation from one another), presents a variety of unique management decision processes, one of which involves the utility and transportation corridor concept. There are some exceptions to these isolation patterns, noteably in Minnesota, northern Wisconsin, the Upper Michigan Peninsula, and the Appalachian Mountains extending from northern Georgia to eastern West Virginia and northern Virginia. These situations do constitute barriers for linear utility and transportation east-west direction development in the form of nearly solid blocks of Federal lands similar to the national forest systems riding the Rocky Mountain and Pacific Coast ranges.

The 20 States included in the Eastern Region contain more than half the population of the United States, while the 13 States in the Southern Region contain over half the remainder. Thus, the 49 national forests and 69 other units administered by the Forest Service in the East contain in a net area of 23,738,329 acres, theoretically must provide the same opportunities for 80 percent of the nation's population that the 102 national forests and 44 other areas containing 142,771,303 acres in the western states and Alaska

Introduction

must provide for the remaining 20 percent of the population.[1]

Section I

Overview of Forest Service Policy and Procedures for Granting Rights-of-Way

The specific policy for the issuance of authorizing documents for linear types of uses of national forest lands is found in the 2700 section of the Forest Service Manual.

Legal authorities are embodied in several acts. Acts pertaining to the types of land occupancies concerned in this report, i.e. highways, railroads, power transmission lines, pipelines, communication systems, and other linear type of right-of-way systems are as follows:

Legislative Authority

Acts of June 4, 1897 (16 U. S. C. 551) and February 1, 1905 (16 U. S. C. 472).

These acts are the basic authorities for granting annual special use permits.[2] The greatest proportion of land occupancy grants are made under this authority.

Act of February 15, 1901 (16 U. S. C. 522).

Permits the use of rights-of-way through national forests for electric power purposes. Annual permits are granted under this authority. Maximum right-of-way widths are 50 feet either side of centerline.

Act of March 4, 1911, as amended (16 U. S. C. 523).

Authorizes easements across national forests lands for communication and power purposes. Easements are limited to 50 years duration, 200 feet on either side of the centerline of the right-of-way and 400 feet by 400 feet on facilitating sites.

Act of March 4, 1915, as amended (16 U. S. C. 497).

Authorizes term permits for recreation and industrial uses across and upon national forest lands. Permits are limited to a maximum of 80 acres and 30 years duration. Because an interest in the land is accrued under this act, these permits by definition are equivalent to a leasehold.

Bankhead-Jones Farm Tenant Act of July 22, 1937, as amended (7 U. S. C. 1010-1012).

Title III of this Act allows for the issuance of licenses and easements

---

[1]National Forest Statistics from "National Forest System Areas" 6/30/73.

[2]Annual permits are permissive licenses renewed annually by the payment of a required fee. Annual applications are not necessary. The permit continues indefinitely as long as the land is not needed for higher priority uses and the conditions of the permit are met.

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Section 1

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across the lands purchased under this authority (L. U. lands).

Act of September 3, 1954 (43 U. S. C. 931c, 931d).

Authorizes the issuance of permits, leases, or easements across national forest lands to States, counties, cities, municipalities, or other public agencies for public works purposes for a period of 30 years without acreage limitations. Under Forest Service policy, the act will not be used unless there is a need for more than 80 acres of national forest land. See Act of March 4, 1915.

Act of August 27, 1958 (23 U. S. C. 107d and 317).

Provides for the Secretary of the Department of Transportation to appropriate and transfer rights-of-way across federally owned lands or interest in lands for Federal aid system highways.

P. L. 93-153 of November 16, 1973 (30 U. S. C. 185).

Provides the authorization to grant permits and easements for the transportation of oil, natural gas, synthetic liquid, or gaseous fuels and refined products.

Regulatory Authority

Regulations of Secretary of Agriculture controlling the use of national forest lands for second party occupancy are found in 36 CFR 251.1, 251.25, 251.65, and 213.3.

36 CFR 251.1 - Defines special uses and authorizes the issuance of permits, leases, and easements.

36 CFR 251.25 - Authorizes the restriction of use and occupancy upon compliance with reasonable conditions.

36 CFR 251.65 - Specifies the conditions under which easements and permits for electric transmission lines of 33 KV and over will be issued.

36 CFR 213.3 - Extends the rules and regulations to national grasslands and other lands administered under title III of the Bankhead-Jones Act insofar as they are controlled by the Forest Service.

General Policies Pertaining to Rights-of-Way and Corridors.[3]

1. Each use application will be carefully considered and approved only when in keeping with law, regulations, and public interest, including the provisions of the National Environmental Policy Act of 1969.

2. Requires the collaboration with other agencies.

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[3]Forest Service Manual (FSM)

across the lands purchased under this authority (U. S. Lands).

Act of September 3, 1954 (68 U. S. C. 924-2512).

Authorizes the issuance of permits, leases, or easements across national forest lands to States, counties, cities, municipalities, or other public agencies for public works purposes for a period of 30 years without acreage limitations. Under Forest Service policy, the act will not be used unless the area is a road for more than 80 acres of national forest lands. See Act of March 4, 1911.

Act of August 27, 1958 (23 U. S. C. 1073 and 3471).

Provides for the Secretary of the Department of Transportation to appropriate and transfer rights-of-way across federally owned lands or interest in lands for federal aid system highways.

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1. Each use application will be carefully considered and approved only when in agreement with law, regulations, and public interest, including the provisions of the National Environmental Policy Act of 1969.

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[5]Forest Service Manual (FSM)

3. All uses shall be subject to applicable Federal and State laws, local ordinances, and the Secretary of Agriculture's regulations.

4. The land to be used shall be suitable for the proposed use and kept as small as is consistent with the intended use.

5. All land use authorizations shall require that adequate provisions be made to protect the land and resources of the United States from unnecessary damage, and payment for damages will be required.

6. The Forest Service will approve the location of all developments. It also approves the design and plans for construction of facilities prior to construction.

7. All use authorizations are subject to valid claims.

8. Permits or easements for power transmission lines 33 KV and over are to be coordinated with the power marketing office of the Department of the Interior and the Rural Electrification Association.

9. Access to national forest lands across non-National Forest land will be the responsibility of the applicant.

10. The use of pesticides and herbicides on Forest Service administered lands must be approved in advance by the Forest Service and will be limited to those materials which are approved and registered by the Department of Agriculture for the specific purpose planned.

Use Restrictions and Limitations. The use and occupancy of certain national forest land is restricted for a number of reasons such as legislation, litigation, withdrawals, or management uses and plans. Examples of these restrictions are the Wilderness system, classified recreation areas, water and travel influence zones, experimental forests, research natural areas, and withdrawals created either by the Department of Agriculture or other Federal Departments and Agencies. While it is possible to use these areas under certain conditions, as expressed by legislation, court orders or withdrawal agreements, the use or occupancy must be conform with the primary purpose of the land restriction.

Land use and occupancy often is restricted by third party interests. This condition is prevelent in the Eastern Region where only about 47 percent of the land was acquired without third party mineral reservations or outstanding rights. The remaining 53 percent of the acquired land in the region has outstanding rights or reservations. Of this 53 percent, 56 percent of the area is subject to one of the various Secretaries' regulations pertaining to surface use. The remaining 44 percent are not subject to these regulations and so the Forest Service has control of the surface. Outstanding rights and reservations constitute an encumberance on the surface. The Forest Service recognizes this situation in the following policy statement.[4]

"The Forest Service is not responsible for the protection of reserved or outstanding rights and may authorize other occupancy of the lands,

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[4]Forest Service Manual 2706, paragraph 8, 4/73.

but the Forest Service must not authorize uses which interfere with those rights. Moreover, such other occupancy privileges as the Forest Service may authorize on these lands must be subordinate to the rights reserved or outstanding. Therefore, conditions shall be placed in each instrument granting use privileges on those lands to protect the reserved or outstanding rights." (Emphasis added)

By the use of the word "privileges," there is a strong intimation that only annual permits, which have a reversionary clause, will be granted over these encumbered lands.

Policy for Granting Land Use Instruments

The policy for granting permits, leases, and easements for utilities is found in the 2728 section of the Forest Service Manual (FSM); for Federal Aid highway easements in 2732 section; for easements issued to State, county, and other similar public road agencies in 2731.4 section; and railroads in 2727.15.

FSM 2728 - General Policy

Either permits or easements may be granted for pipeline, power, and communication uses by the Secretary of Agriculture. Although either document may be used on acquired land for power and communication systems, it is the usual practice to issue annual special use permits for these purposes under the Act of February 15, 1901. For oil and gas pipelines, revisions of the policy are based on P. L. 93-153. The Secretary of Agriculture may issue permits for easements or permits where the project crossing is confined to national forest lands. Thus, in most cases, on eastern national forest lands, these documents will be issued by the Forest Service. Other pipelines, such as water and products and coal slurry pipelines, must be issued under the authority contained in the 1897 Act, since the Secretary of Agriculture has no authority to issue easements for pipelines, except on those lands purchased under the authority of title III of the Bankhead-Jones Act. The various authorities of the Secretary of the Interior do not extend to acquired lands under the jurisdiction of the Forest Service, as they do on Reserved Public Domain lands.

In the interest of land use allocation conservation, it is the policy of the Forest Service that only one transmission line or other uses of similar nature will be granted in a single area or territory, except when power or other systems are planned jointly by two or more transmission companies. This means that two or more systems proposed by individual entities may not be planned for the same general area unless a need has been established and a full coordination is taken by the parties concerned. The policy also provides for joint use corridors "where possible." Multiple use surveys and guidelines are to be used in determining the need for appropriateness and the location of such corridors.[6] Evaluations are based on the following broad objectives:

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[6]FSM 2728.1 Utilities, page 2728.1--1, 1/69

1. Increased or improved cover and feed for wildlife species.

2. Timber type conversion or other management objectives.

3. In grassland biomes, vegetative management is directed to meet the agency production objectives.

4. Incorporation of right-of-way openings into fire control programs, i.e. firebreak systems, access, or suppression (such as back fire locations).

5. Esthetically designed and managed rights-of-way will be developed wherever practicable.

Depending on the management goal selected for sections of the right-of-way, the vegetation is manipulated and managed within the right-of-way to reach the optimum benefits. It must be assumed that any corridors developed on national forest lands will be given the same management direction as for rights-of-way, although this is by inference only under the corridor policy.

FSM 2728.11 Oil and Gas Pipelines

Recently, as a result of P. L. 93-153, the Forest Service has issued emergency directives relating to oil and gas pipelines. This directive will be subject to change when more experience is gained in the administration of this law. Under the Forest Service policy, only special use permits will be granted. All pipelines granted under this act must be consistent with land use allocations. Associated and supporting uses, not a part of the pipeline itself, will be granted using established annual permit procedures and authorities. Ratification of existing pipelines will be through the P. L. 93-153 permit process. Permits will reserve the right to authorize additional rights-of-way or permits for compatible uses on or adjacent to the permitted right-of-way.

FSM 2728.12 Powerlines

Powerline grants may be issued either as permits under the Act of February 15, 1901 or as easements under the Act of March 4, 1911. Generally, permits are granted rather easements. The general policies regarding power transmission lines are quoted:

1. Legitimate public service demands must be accommodated, preferably in ways that do not adversely affect other national forest resources. It is the objective of the Forest Service to limit the number of powerline routes on national forest lands to the minimum needed to fulfill legitimate public needs and to minimize the environmental impacts of those that are permitted.

2. In planning or review of proposals for powerline rights-of-way, use the criteria set forth in "Environmental Criteria for Electric Transmission Systems, U. S. Departments of Agriculture and Interior."

3. When a proposed powerline may cross both national forest lands and lands administered by another Federal Agency, establish early direct liaison with appropriate agency to ensure coordinated review of the proposed rights-of-way.[7]

4. To the greatest possible extent, determine the current (and probable future) needs of other power entities operating in the area.

5. Where feasible, take advantage of advances in power transmission technology, such as undergrounding.[8]

6. In each right-of-way permit, state the number of powerlines to be installed.

This last policy statement would, in effect, create a single system corridor unless additional lines were double circuited.

"Wheeling Agreements" are required on all lines across national forest lands for lines with a capacity of 33 KV or more except in the following States: Illinois, Indiana, Maine, Michigan, Mississippi, New Hampshire, New York, Ohio, Pennsylvania, Tennessee, West Virginia, Wisconsin, and Vermont. This requirement results in a much longer authorization time since permits and the proposal must be reviewed by the Department of the Interior's Power Marketing Office and the Rural Electric Administration (REA).

By administrative decision, the period of authorization of a powerline permit will be limited to a maximum period of 50 years.

FSM 2728.2 Communications

Permits may be issued under the Act of 1897 authority or easements under the Act of 1911 authority. As an objective, all communication systems are to maximize the number of users in the smallest possible area in such a way as to harmonize them with other national forest uses. To accomplish this objective, dual use of electronic transmission facilities, including antennas, is encouraged where compatible, except communication systems which are required by the Department of Defense to maintain defense security. Normally electronic site plans will be prepared where communication hubs become established by the successive applications for two or more sites on the same transmission point.

The policy for pole and cable transmission communication systems is similar to that for power.

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[7]Author's Note: To obtain the fullest benefits from coordinated liaison, all political jurisdictions and the private sector should be included in this review. This is a common practice in some areas at the present time, especially during the period of alternate corridor analysis.

[8]It is now the Eastern and Southern Region's policy to underground all lines less than 34.5 KV, unless it can be shown to be impractical or is not economically feasible.

FSM 2729.11 Water Transmission

The only authority existing for the Forest Service to grant the use of national forest lands for water transmission systems is by the Act of 1897. As a result, only annual permits may be issued. The Secretary of the Interior may issue easements across national forests reserved from the public domain. Since this authority does not extend to acquired lands, as a general rule, only annual permits may be issued on the national forests in the East.

Generally, the same policies on land use apply to water transmission as apply to other buried plant projects, although no mention of this fact is made in the Manual.

FSM 2732 Highways

Since this study deals primarily with the major Federal highway systems, it is assumed that this pertains to the Federal-Aid system. Although the Forest Service does not grant easements for this system, it does consent to the appropriation and transfer of its lands for highway purposes through the Department of Transportation to the various States. (Act of August 27, 1958, 23 U. S. C. 317 and 107d). For other highways constructed and maintained by public road agencies, the Secretary of Agriculture may issue easements under his authority. (Act of October 13, 1964, 16 U. S. C. 532-538).

This discussion will concern itself mainly with easements granted under the Act of August 27, 1958, although processes and policy are generally the same for Department of Agriculture easements, except for certain easement issuance administrative technicalities.[9]

Normally each region enters into a Memorandum of Understanding with state highway departments or other highway administrative agencies in those states where Forest Service management units exist. This memorandum spells out certain procedures which both parties agree to regarding planning, design, construction, maintenance, and other items which are of mutual concern to the State and the Forest Service. When properly developed and adhered to, they create an open forum for the mutual benefit of both parties, which would include corridor planning.

Grants are made for highway proposals only, they do not convey any other right to the State. Thus, the use of the easement grant does not preclude the Forest Service from being an active participant in utility planning within the highway right-of-way limits under this condition. This will ensure that all possible corridors, consistent with the purpose of the highway easement and Forest Service planning, can be based on concepts developed by the Forest Service land use planning process and policy.

The Department of Transportation is the lead agency for National Environmental Policy Act (Section 102-C) Statements, although in many cases the State will prepare the Statement.

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[9]FSM 2732 6/69

The Forest Service prepares one or more environmental analysis reports depending on the complexity of the project. Ideally, the "report" is prepared prior to the "statement", although this is not always the case. Unfortunately, the Forest Service policy does not specifically state the desired sequence, although some Memoranda of Understanding spell out this relationship of the two documents.

All easements issued by the Department of Transportation for highway purposes must be filed with the Bureau of Land Management and recorded in the proper county records.

For the most part, the remaining stated policy pertains to easement granting procedures and is not germaine to this discussion.

FSM 2727.15 Railroads

The Forest Service has only the Act of 1897 statutory authority to issue railroad permits. While the Department of the Interior may issue railroad easements across public domain, including reserved public domain, it has no authority to issue these easements on acquired lands. As a result, most railroad companies secure special legislation to accrue desired rights for protection of their rights-of-way across acquired lands.

Forest Service Planning System

Corridor development, if properly approached, should be based on a system of land use allocation. A primary function of the Forest Service is land use planning and management. To develop the relationship of its land use planning and corridor development, a study of the eastern regions' planning process has been made.

Essentially, the planning process constitutes three separate parts, i.e. (1) planning area guide. This may be broken down to management zones as needed to cover special situations such as water and travel influence zones or other special zones classified or formally designated by Congress, Secretary of Agriculture, the Chief of the Forest Service, or Regional Forester; (2) forest plans or forest coordinating requirements; and (3) unit plans. In each case, the planning approach becomes more precise and is related more directly to a local situation.

Each level of planning is concerned with the economic, social, environmental situation, and resource development and use as it relates to those factors which create the planning situation. A set of assumptions are established about the future, which are used as determinates in resource allocation. This information then sets forth the criteria for opportunities and constraints to be followed during the life of the plan and provides guidance to the lower order of planning. This planning process is designed to provide an orderly approach to decision making by displaying the data and information acquired, the analysis of this data, the reasoning and rationale used, and the full range of management implications for each alternative plan of management.

Area Planning

The Appalachian (joint Eastern and Southern Region), New England (Eastern Region), Ozark Highlands (joint Eastern and Southern Region), and Coastal Plains and Piedmont (Southern Region) Area Guides were reviewed to obtain the consensus of guidance for management related to rights-of-way or corridors.

All of these plans recognize the growing impacts of use and the demands on national forest lands to fulfill the growing need for goods and services at an accelerated rate. The objective of these guides appears to be restrictive in their approach to utility development and growth. There does not appear to be any planned program to absorb these developments into Forest Service programs, but to shunt them aside to areas where they may have a minimal effect on its resource management objectives. Such direction as, "Special use permits will not be issued for uses which can be provided on other ownerships," "Utility corridors will be established, where possible, through areas having low potential for contributing to the objectives of the area," and "Allow special uses only on lands suitable for the uses, and under conditions which protect the public interest, including proper consideration of environmental quality and landscape integrity" illustrates this point. When coupled with the tremendous demands on the national forest lands for products and services, it appears that the areas which may be made available for transportation and utility rights-of-way and corridors will become increasingly restrictive. Some of this lack of realization regarding corridor development as a valid function of land use management may emanate from the lack of analytical consideration given the real estate aspect of national forest management as compared with the more traditional management areas such as timber, forage, wildlife, recreation, and water. The historical lack of need or demand for rights-of-way in large numbers on a given unit may also be a contributing factor.

Another apparent omission in these guides is the failure to differentiate between distribution and transmission systems. This may be understandable considering the scarcity of transmission development, except in isolated situations. Since various sizes of transportation and utility systems create different land use impacts, it appears that this failure may have a long range detrimental effect on the planning system.

Another planning situation apparently has been overlooked. Mineral development requires both power and transportation, usually of significant proportions. As an example, the Ozark Highlands planning guide indicated that mineral production in terms of dollars will increase from $1.4 billion in 1969 to $3.9 billion in 1990. Assuming that the dollar valuation will remain somewhat constant (perhaps a fallacious assumption with current inflationary trends), production will increase approximately 280 percent with an increasing need for power capacity and transportation facilities, unless these have been overbuilt to absorb this increase. The plan, however, fails to mention this relationship.

Forest Planning

The next step in the planning system is the Forest Plan. This plan becomes more specific and detailed than the area guide, but takes the direction

developed in the guide.

Some of these plans recognize the benefits of management resulting from linear types of land uses. The one most often mentioned is wildlife habitat, although some consideration is given to their importance in fire management. This latter possibility was discussed with the Division of Fire Control in Milwaukee and it was the general feeling that rights-of-way and corridors could be integrated into the firebreak system being developed by the Eastern Region, when the relationship was thoroughly studied. Many of these forest plans bring out the land ownership patterns of the national forests in the East. This ownership has a negative effect on planning for corridors. Except in situations where significant blocks of contiguous national forest ownerships exist, careful consideration must be given to the impacts on intermingled and surrounding lands in either rights-of-way or corridor planning. No, or at the most very little, recognition of this factor is being made at present in forest plans reviewed.

The public also is recognizing this factor, as illustrated by the following comment:

> "Under special uses, I would question the validity of disallowing some of the so-called non-compatible uses such as power, pipelines, and other rights-of-way and community type uses where these are just as non-compatible to private land owners that have to be put up with (this situation)."[10]

Possible coordination of corridor planning between the private sector and the national forest system was discussed with J. Sidney McNight, former Director of Cooperative Forestry, State and Private Forestry in the Chief's Office. Because of the dominance of small private land holdings adjacent to and intermingled with national forest lands in the East, he felt the chances of coordinated corridor planning between the public and private sector was relatively remote over much of the two Eastern Regions. He did, however, recognize the possibility of this type of planning in the deep south where large timber holdings by the timber industry adjacent to national forests might be integrated in a corridor development system with Forest Service planning.

Forest plans make a requirement that all special uses will come under "analytical scrutiny" to determine if the uses are compatible with management objectives. It is apparent that utilities will be analyzed to determine if they are a conforming use. As an example in the Monongahela Forest plan, rights-of-way for utility systems will be prohibited across scenic recreation and historical areas and those in place are scheduled for removal.

This scrutiny has special significance when measured against the increasing development of corridors to protect the natural beauty along highways. Highway corridor scenic areas that have been established, such as by the Monongahela National Forest along U. S. 39, U. S. 33, and U. S. 250. In the Eastern Region, this action has all but eliminated multi-system corridors under these conditions, as aerial systems are thought to be non-conforming uses. The Southern Region is taking a somewhat different attitude. They feel that scenic corridors (travel indluence zones) are not necessarily non-occupancy zones or corridors, providing that intrusive elements can be made compatible with

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[10]Vince Crane, Farm Bureau, Jefferson City, Missouri, in public comments of the Unapproved "Missouri National Forests" forest plan.

the major objectives.

Some of the forest plans do call for studies to determine localities for corridors. No other guidelines are given or is any criteria established to determine where these corridors should be established.

The maintenance of the enhancement of the visual environment appears to be of major concern on certain forests such as the White Mountain Forest in New Hampshire and Maine. Because of the high incident of use for recreational purposes,[11] much of the policy is directed toward the primary object of recreation resource protection and enhancement. This could have a negative effect in corridor development when the area guide direction is taken into consideration, even though the expected increase for power, for example in New England, is from 220 billion KV in 1966 to 900 billion KV in 1990[12] although the impact of this projected increase on National Forests is unknown. Regardless of this, the New England guide as an objective states "Permit only those special uses that are compatible with and contribute to National Forest objectives. Nothing is said about need. From the environmental and general management philosophies developed in the various plans reviewed, it does not appear that the development of rights-of-way and corridors is not compatible with other management objectives, except in very isolated cases.

Corridors will derive from established right-of-way systems, for the most part. For example, the Ocala National Forest plan calls for an existing pipeline as its north-to-south corridor. For east-west transmission lines, where presently no right-of-way exists, an environmental statement will be required to develop a corridor. U. S. 40 will not be used as a basis for corridor development.[13]

Forest plans generally call for a proof of need by the proponent before easement or permit will be granted.

On the whole, the philosophies expressed in the forest plans do not vary a great deal. Land development for utility corridors (mainly power and pipelines) will be confining and secondary to other national forest goods and services. There appears to be a very strong emphasis in the eastern national forests to protect these relatively small enclaves the mass land pattern against intrusive situations, such as utility development. It is apparent, that for the most part, they are dedicated to the objective of intensive forest management of the renewable resources, apparently to the point of demonstrating and illustrating these practices to other segments of the industry and private land holdings. In this, they have succeeded. In view of the increased demands of these resources, while maintaining an acceptable environmental integrity, this management philosophy is valid.

Because of this situation, the establishment of corridors (R/W's) will be allowed on national forest lands only after a thorough compatibility analysis,

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[11]The White Mountains Forest is within a day's drive of 62 million people.

[12]Guide for Managing the National Forest in New England.

[13]Plan for Managing the Ocala National Forest, p. 15.

and then only, as a "last resort-no alternative" basis.

Unit Planning

The most intensive level of planning in the Forest Service planning system is the Unit Plan. Thie plan is developed within the objectives, policies, and direction developed in area guides and forest plans, and covers all aspects of environment and management for the unit. It becomes the basis for all action within that unit. All programs, activities, and services must be based on the direction established within the specific unit boundary.

Normally, the unit plans present an array of management alternatives based on its potential and capabilities. From these alternatives, the one which most nearly reaches a desired management objective based on a combination productive, economic, environmental, and social capabilities is selected. In some instances, these objectives are developed in the forest plans, while in other situations the objective is established in the Unit Plan.

Forest Service policy dictates that an Environmental Statement be written for each unit. Thus, the objectives and all alternatives come under the scrutiny of the public, other Federal agencies and political subdivisions, and other organizations and institutions.

Management is projected for a ten-year period. Significant changes in existing conditions may be the basis for a complete evaluation of the management objectives, which may result in a complete re-analysis and plan.

Management objectives vary greatly from plan to plan. It is therefore, difficult to arrive at a generalized conclusion regarding corridor planning or development. Inferences, therefore, must be developed from a review of several plans reviewed for this study. This will best illustrate the management policy relative to transportation and utility development pertaining to this segment of the planning system by a brief review of several unit plans.

Kilkenny Unit, White Mountain National Forest, New England Management Area, Eastern Region, State of New Hampshire

This plan is in rough draft, so additional information may become available. The plan inventories the present transportation and utility system under permit. There is no stated size class, but includes the following:

8 roads involving 16 acres
3 power lines involving 18 acres
2 buried telephone lines involving 3 1/2 acres

There is a statement in the plan that "there may be need for an east-to-west corridor for a major transmission line." No other mention of this fact is made nor is any recognition of the influence of such a corridor on the selected or alternate management options.

Red River Gorge Unit, Daniel Boone National Forest, Appalachian Area, Southern Region, State of Kentucky

A land use inventory is included in the report but no size classification is made.

1 Pipeline includes 0.2 acres
2 Powerlines includes 29.3 acres
9 Roads includes 127.8 acres
2 Telephone line includes 3,1 acres

Change in management direction caused by the construction of a reservoir by the Corp of Army Engineers will eliminate one power line and four roads.

Management Direction for Special Uses

-- Special uses will be limited to those compatible with the management and protection of the unit.
-- Two utility corridors, on south of Kentucky Highway 15 and the other across the southern part of the unit, will be followed by all new pipelines and power lines over 34.5 KV. <u>There will be no new utility corridors established</u>.

-- Within the Geological area, power transmission lines and telephone lines will be placed under ground where technically feasible.

Under the second statement regarding the corridor development, the corridors illustrated on the map are dead end land allocations. That is, they do not extend across the unit, but apparently are for local consumer use. The largest of the two is approximately 1 1/2 miles long by 1 1/2 miles wide, while the other has a north-south axis of about 1 1/2 miles with an east-west axis of about 1/2 mile.

The above appears to be the only expression of management regarding rights-of-way or corridors.

<u>Juniper-Hughes and Pat's Islands Units, Ocala National Forest, Coastal Plans Area, Southern Region, State of Florida</u>

Land ownership:	Units gross area	20,000 acres
	PVT Ownership	3,000 acres
	Federal ownership	17,000 acres

Inventory:

10 miles of power lines
10 miles of telephone lines
11 miles secondary highway systems

Among the problems listed are

-- The existing power lines above ground are esthetically undesirable.

An objective statement alludes in part to utilities and states "Reappraise and initiate action on special land uses." The action to be carried out in the plan is to "have all existing power lines located underground by the end

of the planning period." (1975)

No other reference to corridors or rights-of-way are mentioned in the plan.

North River Unit, George Washington National Forest, Appalachian Area, Southern Region, State of Virginia

The management direction for the unit is directed to a primitive, dispersed recreation management. The unit contains 48,913 acres of which 48,913 acres of National Forest land and 4,056 acres in private ownership. In 1970, the population totaled 10,573,000 within a 150-mile radius.

Inventory of utilities:

2 power lines total 6.68 miles
1 telephone line total 2.5 miles (2.18 miles are on joint power poles.)

The policy or direction developed for future application states, "Future use applications will be approved only after determination that no reasonable alternative exists and benefits would outweigh adverse impacts on other uses and resources."

No other expression regarding utilities appear in the plan.

Upper Hiwassee Unit, Cherokee National Forest, Appalachian Area, Southern Region, State of Tennessee

Approximate National Forest Service land in Unit . .	47,740
Approximate Private land in Unit	32,840
TOTAL	80,850 acres

Management direction for the unit is toward a coordinated timber-wildlife production program. The Hiwassee River is a State scenic river and all planning is directed toward the preservation or enhancement of the scenic attributed of the river.

There are two power lines on 19.9 miles of right-of-way, and 5 roads totaling 7.42 miles in length.

Management calls for

-- The regulation of right-of-way vegetation to maximize wildlife benefits.
-- Improve visual resources along power lines with landscape management practices.
-- All existing special use permits within the unit will be continued, provided conditions of the permit are being met.

The plan then continues with a right-of-way regetative program. It does not, however, express another management guidance regarding new permits or corridor development.

No major highways traverse the unit.

Although this unit is in the major Tennessee Valley Authority (TVA) operating area, they made no comment on the plan regarding the unit's relationship with that agency's programs, although the TVA expressed much concern over the Forest Service right-of-way and corridor policies at a meeting held in Denver on January 17, 1975. The TVA was unresponsive to this question in their comments in the Draft Environmental Impact Statement for the Unit. It appears that if the concern expressed at the Denver meeting is real, they would have been more responsive in the Unit Plan.

Petit Jean Unit, Ouachita National Forest, Ozark Highlands Area
Southern Region, State of Arkansas

Gross area of Unit - 140,817 acres. National Forest lands comprise 85 percent of the total acreage in the unit, and are well consolidated, although are divided by a private land corridor about 1 1/2 miles wide in a south westerly-north easterly direction approximately in the center of the unit.

Management direction for the unit appears to be a balanced resource use and development program designed to supplement each other to the greatest possible extent.

Two special areas are considered in planning:

-- Dry Creek Eastern Wilderness candidate area contains 5,500 acres and is designated for study in Senate Bill 3433.
-- Dutch Creek Mountain Scenic Area designated by the Regional Forester in 1959. It contains 376 acres.

At the outset, these two areas must be considered as exclusion areas for corridor development.

Presently, there exists three electronic sites, 6 miles of pipeline, and 1 1/2 miles of power transmission lines. In addition, there are 16 miles of power distribution lines. The transmission lines run generally in a north-south direction. Additional facilities are being proposed. One is a power line running from 3 miles north of Norman to Danville, Arkansas. Approximately 2 1/2 miles of this line will cross national forest land. Also, a coal slurry line has been proposed by the Energy Transportation Systems across the southwest corner of the unit. About one mile of this line will be on National Forest lands, in two separate segments. If these two facilities are authorized the plan calls for them to become the basis for future corridor planning, amounting to north-south corridors in the east and west extremities of the unit. No east-west corridors are considered in the plan.

No other direction is given.

In discussion with Forest Service Regional Personnel looking for the reasons behind the lack of direction for utility and transportation corridors consideration in these plans, they felt that the utility transmission and transportation systems were fairly well developed and that past experience

has shown that very little was made on the eastern national forest systems to provide right-of-way or corridors. It is their opinion, that because of these factors, the unit planners feel the effort required to go into corridor development in depth would not be justified in view of the more pressing problems confronting forest management.

Environmental Analysis Reports

While environmental analysis and reports are not a direct part of the Forest Service planning system, they have a distinct place in its decision making process and, as a result, become an adjunct to the planning system.

These reports are much the same as environmental impact statements and their content is usually patterned after the "statement" format. They are an in-house requirement for all in or out service proposed projects. Throughout the planning levels previously discussed, environmental analysis and reports are stressed as a mandatory requirement for utility and transportation use of National Forest lands.

They serve several purposes:

1. To determine if the proposal is compatible with other management objectives and to determine whether the proposal will or will not be approved and an occupancy document issued.
2. If the proposal is found to be compatible, it analyzes the proposal from the environmental and resources stand points to determine the impacts on these elements.
3. Analyzes alternatives to the action being proposed by the applicant and makes recommendations regarding mitigating requirements.
4. Determines if the proposal is a major federal action and if so, that an environmental statement is required under Section 102-C of the National Environmental Policy Act.

Generally, it is through the environmental analysis process that corridors are established. Thus, corridors usually are not established unless and until there is a demand and the action to establish the corridor is feasible and desirable and the rationale behind the decision is fully documented. Realistically then, single and multi-use corridors will become established only as a result of a reactive action, such as the result of an application or proposal to use national forest land for a specific project.

An essential factor in establishing corridors is known when applications are made, that is, the point of generations and the point of use or distribution points. Without these vital pieces of information, corridors within the concept of this study are virtually impossible to determine. The environmental analysis and report process then becomes a significant factor in establishing development of corridors.

Several of these environmental analysis reports were reviewed in both the Eastern and Southern Regions. Only two concerned themselves directly with corridor establishment. The remainder developed multi-use corridors as a direct result of the analysis, based on an already existing right-of-way. Corridor establishment was not theoretically the primary objective of these

studies. Principally, the study teams were looking toward solutions in solving problems created by applications to cross national forest lands. In most cases, paralleling of new facilities with existing facilities in a common corridor was only one of the alternatives reviewed. The multi-use corridors were established as a result of critical impact analysis and the planning system direction. These reports, in many cases, reversed the planning decisions previously made by the proponents. It is felt this analytical approach is a significant element in the establishment of corridor systems.

Case Studies

To illustrate this process more fully, a few case studies will be reviewed.

Case 1 - 1966 Application for a 36-inch natural gas pipeline across the Chippewa National Forest, Minnesota

Prior to this application, a highway, railroad, and pipeline corridor existed on the Forest from Cass Lake to Ball Club, Minnesota. This corridor included the following elements: U. S. Highway 2, Great Northern Railroad, one 18-inch oil pipeline, one 26-inch oil pipeline and a 34-inch oil pipeline. When the application for the 36-inch gas pipeline was made, it was determined that the widening of the established corridor would not be acceptable because visual factors within the Travel Influence Zones established along U. S. Highway 2.

Based on this decision, the forest investigated three possible alternative corridors, including one which routed the pipeline completely outside the forest boundary to the south. This latter alternative was eliminated, because adverse resource effects caused by greater distances and numerous "water crossing" which would subject this area to potential water pollution.

The selected corridor created the least impacts on associated resources. Maximum width of the corridor was determined to be 200 feet, which was felt could accommodate six pipelines. A twenty-foot spacing between pipelines was assumed. At a point about half the distance across the forest, it approaches the established corridor previously mentioned. An intervening space of 700 feet between the two corridors was designated to provide for manageable wind firm timber screening from the highway to the proposed corridor. It is the intent of the corridor plan to require large pipe sizes, in the order of 48 inches, for any additions to the proposed corridor.

In 1971, an application for a 48-inch oil pipeline was made and it was determined that the pipeline would be placed in the planned corridor.[13] However, a different construction methodology was proposed. As a result of this proposal, a second environmental analysis report was prepared to determine the advisability of this proposal. After the analysis, it was determined that the surface construction proposal was acceptable. The 48-inch oil

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[13]Letter dated February 19, 1970 from Chippewa Forest supervisor to Lakeland Pipeline Company in which he informed the company that any further construction would be in the planned corridor.

pipeline will be constructed 50 feet from an existing 36-inch gas pipeline. (See Exhibit 8). It is noted that the original planning for the corridor was a twenty-foot spacing. No reason appeared in the analysis for the increase to the established 50-foot spacing.

The time involved in this study analysis and report extended from October, 1971 to January, 1973.[14]

Case II - 1966 Application for a 36-inch gas pipeline across the Chequamegon National Forest in Wisconsin and the Ottawa and Hiawatha National Forests in Michigan.

This pipeline is a continuation of the 36-inch pipeline reviewed in Case 1. Indications are that little advanced information was given the Forest Service when a right-of-way was requested and that the proponent had completed a great deal of their reconnaissance to the point where major location changes would not be acceptable to the proponent.

This stand was based on the following points:

1. "Pipelines had to be kept secret according to FPC rules."[15]
2. "Presently proposed location is the result of intensive reconnaissance which has been going on for some time."
3. "New cost estimates, resulting from a different location, would require filing a new application with FPC. Since other carriers are presently attempting to block FPC approval on the basis of more economical methods, the Company is reluctant to file a new, more costly estimate."
4. "For a public agency to require major locations is without precedent and not expected by the proponent."[16]

In the multiple-use survey report (now Environmental Analysis Report), standards for construction was a 75-foot right-of-way with a final operation and maintenance width of 30-40 feet for a 36-inch pipeline. The analysis determined that the greatest beneficial resource affects for this pipeline location would be to place it at least one mile from an existing oil pipeline. Forest personnel felt that this would maximize the benefits for wildlife, recreation and access, and have the least detrimental effects on the other resources. For example, the one-mile strip of timber between the existing and proposed pipe lines would maintain a body of timber sufficiently large to manage, while the other alternatives, i.e. (1) placing the new line near the existing line with a narrow intervening strip of timber or (2) directly adjacent rights-of-way with no intervening timber strip, would completely eliminate any possibility for integrated timber management. Of the two rejected alternatives, (2) would have been the one most preferred. Both the Ottawa and Chequanmegon National Forests concurred in this one-mile

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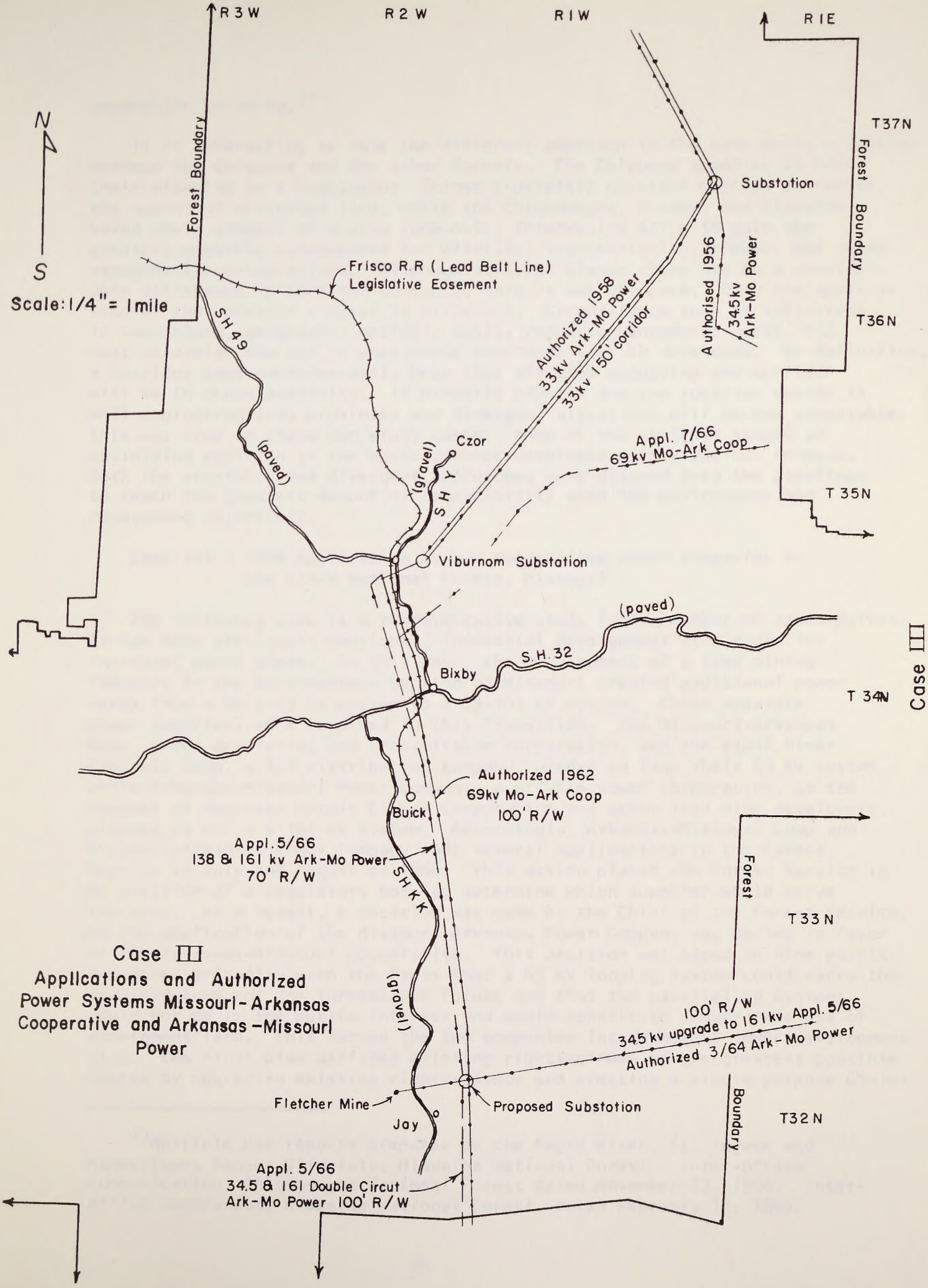
[14]This case study is contained in two reports. The first, a multiple use survey report (undated, but probably prepared in 1966) which established the planned second corridor across the Chippewa National Forest based on an application by the Great Lakes Gas Transmission Company, and the second dated January 3, 1973 based on an application for a 48-inch oil pipeline by the Lakeland Pipeline Company some time in 1970.

[15]The Federal Power Commission regulated interstate gas pipelines.

[16]Inter-office memorandum, Hiawatha National Forest dated February 16, 1967 file #2720 - Great Lakes Gas Transmission Company.



Case III

Applications and Authorized Power Systems Missouri-Arkansas Cooperative and Arkansas-Missouri Power

From plat in Multiple Use Report, 1966

separation criteria.[17]

It is interesting to note the different approach to the same basic situation between the Chippewa and the other forests. The Chippewa appeared to base their planning on a contigeous (close proximity) corridor concept to reduce the amount of disturbed land, while the Chiquamegon, Ottawa, and Hiawatha based their concept of a wide (one mile) intervening strip to gain the greatest possible enhancement for wildlife, transportation, timber, and other management considerations. Although at first glance there may be a considerable difference in corridor concepts, this is not the case. Only the application of the corridor concept is different. Circumstance such as variations in topography, geography, geology, soils, resource management needs, etc. must determine how and in what forms corridors will be developed. By definition, a corridor does not necessarily mean that all uses occupying the corridor will be in close proximity. If properly planned and the location design is well engineered both proximity and divergent situations will become acceptable. This was true in these two study cases. None of the analysis showed an unyielding position to the basic concept developed by the various forests. Both the proximity and divergent approaches were planned into the pipelines to reach the greatest amount of compatibility with the environment and management objectives.

Case III - 1966 Application by two competitive power companies on the Clark National Forest, Missouri

The following case is a representative study from a number of stand points. As has been previously mentioned, industrial development is a cause for increased power needs. In this case, the development of a lead mining industry in the Southeastern section of Missouri created additional power needs from a 34.5-69 KV system to a 69-161 KV system. Three separate power suppliers were involved in this transition. The Missouri-Arkansas Coop, a REA generating and transmission corporation, and the Black River Electric Coop, a REA distribution company, wished to loop their 69 KV system, while Arkansas-Missouri Power Company, a private power corporation, at the request of American Metals Climax Corporation and other lead mine developers, planned to build a 161 KV system. Accordingly, Arkansas-Missouri Coop and Missouri-Arkansas Power Company made several applications to the Forest Service in July and August of 1966. This action placed the Forest Service in the position of a regulatory body to determine which supplier would serve the area. As a result, a decision was made by the Chief of the Forest Service, and the application of the Missouri-Arkansas Power Company was denied in favor of the Arkansas-Missouri cooperative. This decision was based on nine points concerned primarily with the facts that a 69 KV looping system could carry the required load for the foreseeable future and that two paralleling systems would not be in the public interest and would constitute unwarranted use of government land. This forced the two companies into a mutual power development plan. The final plan utilized existing rights-of-way to the greatest possible degree by upgrading existing rights-of-way and creating a single purpose 69-161

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[17]Multiple Use reports prepared by the Rapid River, St. Ingace and Manestiques Ranger Districts, Hiawatha National Forest. Inter-office communication, Chiquamegon National Forest dated November 23, 1966. Inter-office memorandum, Hiawatha National Forest, dated February 16, 1967.

separation criteria.[77]

It is interesting to note the different approach to the same basic situation between the Chippewa and the other forests. The Chippewa appeared to base their planning on a conservative rating approach, attempting to reduce the amount of disturbed land, while the Chippewa, Ottawa, and Hiawatha based their concept of a wide zone relief intervention strip to give the greatest possible advantage for wildlife, transportation, timber, and other management considerations. Although as figure 3 shows there may be a considerable difference in corridor concepts, they do not the same. The two applications of the corridor concept is different. Differences such as variations in topography, geography, geology, soils, resource management needs, etc. must determine how and in what forms corridors will be developed. As delineation, a corridor does not necessarily mean that all land occupying the corridor will be in close proximity. It properly planned and the locally design is well engineered with problems and divergent situations will become acceptable. This was true in these two study cases. Some of the analysis showed on negotiating condition to the basic concept developed by the various forests. Both, the originally and divergent approaches were planned into the pipeline to reach the greatest amount of compatability with the environment and management objectives.

Case III - (Oil Application by two competitive power companies on the Ottawa National Forest, Michigan)

The following case is a representative study from a number of areas points. As has been previously mentioned, industrial development is a cause for increased power needs. In this case, the development of a land mining industry in the Southwestern section of Michigan created additional power needs from a 34.5-69 kv system to a 69-161 kv system. Three separate power suppliers were involved in this transition. The Michigan-Wisconsin Coop, a REA generating and transmission corporation, and the Black River Electric Coop, a REA distribution company, wished to loop their 69 kv system, while Arkansas-Missouri Power Company, a private power corporation, at the request of American Metals Climax Corporation and other land mine developers, planned to build a 161 kv system. Accordingly, Arkansas-Missouri Coop and Missouri-Arkansas Power Company made several applications to the Forest Service in July and August of 1960. This action placed the Forest Service in the position of a regulatory body to determine which supplier would serve the area. As a result, a decision was made by the Chief of the Forest Service, and the application of the Missouri-Arkansas Power Company was denied in favor of the Arkansas-Missouri company. This decision was based on nine points concerned primarily with the facts that a 69 kv looping system could [illegible] the required load for the foreseeable future and that two competitive systems would not be in the public interest and would conclude unnecessarily use of government land. This forced the two companies into a mutual power development plan. The final plan utilized existing rights-of-way to the greatest possible degree by adjusting existing rights-of-way and creating a single purpose 69-161

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[77] Multiple Use Planning prepared by the Ranger District, St. Ignace and Manistique Ranger Districts, Hiawatha National Forest, Intersystem coordinating, Chippewa National Forest dated November 23, 1960. Intersystem Planning Committee, Hiawatha National Forest, dated February 16, 1961.

KV corridor for approximately 17 miles and a double circuit 34.5-161 KV corridor for an additional 8 miles. (See Figure 4 appendix). This is one of the few cases where power system planning is evident.

It is interesting to note that the lead mine industry caused the construction of a new railroad approximately 31 miles long, approximately 23 miles is within the forest boundary. The authorization for this railroad on Federal lands is provided by special legislation, since the only authority for issuing a permit was contained in the Act of 1897. The legislative act granted easement rights.

Case IV - Dixon - Ft. Leonard Wood - Salem 161 KV Power Line, Missouri National Forest, Missouri. Show-Me Power Corporation. The subject line is 54 miles long, four miles of which are on Forest Service administered lands.

This case illustrates another approach to the decision-making process, one which limited to a very large degree any involvement by the Forest Service in determining the line location. All engineering had been completed an an environmental statement written before, as far as could be determined from the record, a firm application was made to the Forest Supervisor, although route discussions had been held between the Forest Service and Show-Me Power Corporation.[18]

Indications are the rights-of-way on private lands were purchased prior to the date of the Forest Service application. In spite of these factors, the Forest Supervisor attempted to have the case reconsidered based on several alternatives which he felt were valid. These alternatives mainly concerned the use of existing 69 KV rights-of-way..

The Show-Me Power Corporation (a REA Coop) prepared the Environmental Statement for the project. In the Statement, they presented three alternatives, one of which was the rebuilding the 69 KV lines to 161 KV capacity. They discarded this alternative primarily on economics and a time element.

The net result of this case: The Forest Supervisor was unsuccessful in his attempts to include any Forest imputs into the final decision and was instructed to issue the permit on the route proposed by the company. This was done on September 14, 1972.

There appeared to be no systems planning approach in this case as in Case III, and no attempt to develop an enlarged system by the use of established corridors. The over riding engineering requirement was to keep this line "as straight as possible between supply points." The claim was made that this approach is the most economical (which may be true) and disturbs less area (which may also be true but not necessarily the best land use allocation when the forest resources and the environment is taken into consideration).

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[18]Memorandum from Forest Supervisor to Regional Forester dated January 4, 1972 which in part says, "It must be stated that at this time there was considerable discussion with Show-Me Power Corporation regarding line routing prior to the selection of the applied for right-of-way."

If one is permitted to speculate it appears that the decision was finally based on political reasoning, rather than on wise land use planning.

Case V - Gilette Wyoming - Little Rock, Arkansas 30-inch slurry pipeline Ouachita National Forest Arkansas, Betchel Corporation

This is a current case for which no grant has been made. It is entirely possible that for political, environmental and economic reasons this line will not be built. It does illustrate a relationship between a proponent and a public land management agency.

Two meetings have been held. At the first meeting, Betchel, who is an agent for a third party (unknown), was very reluctant to make any definitive information known. They revealed that a 75-foot construction width would be needed and that according to their plans would cross about 6 miles of the forest. They agreed that minor deviations from their planned route would be acceptable, but they would resist any major route changes. About four months later (February 14, 1974) a second meeting was held. At this time, the Forest Service informed Betchel that alternate corridor studies would have to be made. This matter was then dropped and the meeting continued on discussions of "details of construction, changes in right-of-way alignment for esthetic and other reasons, maintenance requirements and overall impact on resources."[19] Betchel indicated they could not reveal what was being planned "due to the uncertainties and political aspects of the project." This autocratic attitude on the proponent is well illustrated in a number of other cases reviewed. As long as this attitude persists on the part of industry, it will be difficult to bring a great deal of order into right-of-way or corridor development. Industry attitudes must certainly change. This will be difficult to accomplish, considering the attempt and accomplishments illustrated in Case IV and this case, since delays and agency stands invariably come under political scrutiny and pressures. It can only be accomplished by continuing and understanding liaison between industry and public land management agencies or by the passage of more stringent laws and regulations.

Case VI - Carteret-Craven Electric Membership Corporation Newport to Simpson, North Carolina National Forests. 115 KV power line.

Through negotiations, the corporation agreed to upgrade an existing 34.5 KV power line to a 115 KV line using the same corridor. No additional right-of-way clearing or land use impacts resulted from these negotiations. This case illustrates two situations which imposed problems on the proponents.

The first situation involves time frames. In this case, these negotiations took three years to complete. During this time, the load increased 98.4 percent, which was far beyond the capability of the existing circuit.

The other problem stems from what should be done with the existing facility and how to overcome technical construction difficulties in overbuilding a changed line.

These two points are frequently overlooked when entering into negotiations

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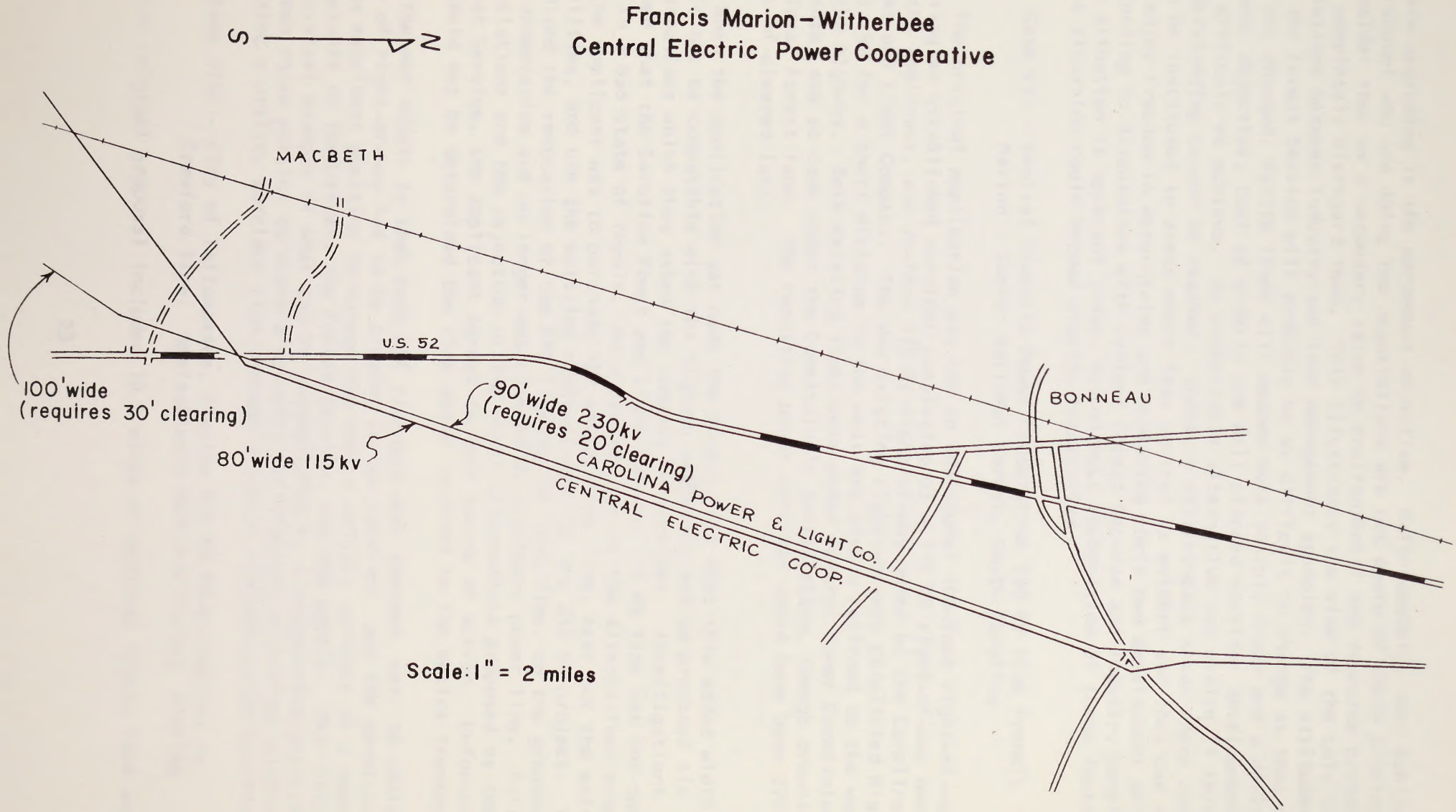
[19]Report of meeting of February 14, 1974, reported dated February 26, 1974.


S
N
Francis Marion-Witherbee
Central Electric Power Cooperative
MACBETH
U.S. 52
BONNEAU
100' wide
(requires 30' clearing)
80' wide 115 kv
90' wide 230 kv
(requires 20' clearing)
CAROLINA POWER & LIGHT CO.
CENTRAL ELECTRIC CO'OP.
Scale: 1" = 2 miles

Case VII

where upgrading is the paramount objective. Unfortunately, many public land personnel who are doing the negotiations are not aware of these problems, consider them as a secondary issue to environmental and resource protection, or completely disregard them. This illustrates the side of the coin in relations between industry and land management agencies. The attitudes of the Forest Service will probably be as difficult to change as that of industry. If not changed, battle lines will become more sharply drawn and a desirable common objective, that of orderly and well planned corridor development, will be difficult to achieve. An undesirable alternative may evolve if this understanding cannot be reached. Industry will by-pass areas where controls can be instituted to areas where less control is evident and they can continue to enjoy freedom in determining and achieving their own development objectives. According to discussions with various Forest Service and industry people, the situation is apparent today, but without recognition of these factors, this situation could become greatly intensified.

Case VII - Central Electric Power Cooperative 230 KV line Francis Marion - Sumter National Forest, South Carolina

The original application was for an additional 100-foot right-of-way abuting an established corridor consisting of a 115 KV right-of-way owned by the applicant, and 70-foot 115 KV right-of-way owned by the Carolina Power and Light Company. The two existing rights-of-way paralleled Highway U. S. 52 for a short distance to the west and also a railroad to the west of the highway. Both existing lines were under Federal Power Commission license, and so came under the Commission's jurisdiction, though crossing National Forest land. The resulting power corridor would have been 270 feet of cleared land.

When the application was made the forest felt that this added width would not be compatible with the highway esthetics and so proposed six alternatives which they asked the company to consider. Investigations showed that the Carolina Power and Light Company 115 KV line was not operating and in a bad state of repair. As a result, one of the alternatives proposed to the applicant was to purchase the unoperative line, tear out the existing facilities, and use the existing right-of-way for the 230 KV project. This involved the revocation of the FPC license for that line, on the grounds it was unoperative and no longer was classed as a primary power line. Following negotiations and the rejection of the other alternatives proposed by the Forest Service, the applicant agreed to this course of action. Unfortunately, it could not be determined the time spans involved in the entire transaction.

The net result is that both FPC licenses were revoked, only 20 additional feet of right-of-way had to be cleared in the corridor, and the permittee is in an excellent position to manage the entire utility corridor in a manner acceptable to themselves, the Forest Service, and the public. This illustrates a classical example of what can be accomplished by a cooperative attitude between three parties to reach a mutually satisfactory objective, without creating a utility corridor slum through a scenic transportation corridor.

Case VIII - City of Tallahassee, Florida 230 KV Power Hopkins to Crawford line. Apalachicola National Forest, Florida

The original proposal included 10.5 miles of national forest land and

10.7 miles on private land. The purpose of the line was to provide an interconnect between the applicants Hopkins Generation Station and their Crawford Substation to provide an interconnect and an exchange of power with a 230 KV Florida Power Corporation system. A unique aspect of this proposal involved airport corridors and landing patterns of the Tallahassee Municipal Airport. This factor was analyzed in making the final decision. Originally the application included the upgrading of the entire municipal system. The application was later amended to include only the subject line. No reason was given for this action in the Environmental Impact Statement written for the project, although the statement reports that it is expected that the ultimate planned system will impact 25-30 thousand acres of National Forest lands. Some consideration was given to this factor, but it appears that while the Forest Service had an opportunity to analyze the entire system and not merely one of its parts, it did not take advantage of the opportunity. Had they taken this action, it would have presented a much better understanding of the total environmental impacts created by the city's power plans and programs.

The Environmental Impact Statement evaluates five alternate planning corridors and a sixth alternate proposed by the Forest Service in an objective manner. Although no permit had been issued at the time this report was prepared, it is assumed that the alternate proposed by the Forest Service will be used as the basis for the permit. This involves about 15 miles of national forest lands and six miles of private land. This is compared to an approximate even split between Federal and private land in the original proposal. This corridor uses an existing gas pipeline right-of-way for about 1/2 of the total distance on the northern portion of the project. (See Figure 5 appendix).

The first application was made on March 15, 1973 and the final Environmental Impact Statement was submitted on October 16, 1974, a time span of about 20 months including the 30-day waiting period following the submission of the final statement before authorization could be granted.

This case illustrates the point again that industry and government can arrive at maximum benefits by cooperation. It also illustrates that when needed the Forest Service is willing to use its land for the public interest, although reasonable alternatives existed. This can only be accomplished through thorough and compatible relationships and realizations of the total stake all entities have the final decision.

Section II

Corridor Systems on Eastern National Forests

The time available to make this study did not allow for an in-depth study of inventories and specifics outlined. An attempt was made to overcome this deficiency by sending out questionnaires to the National Forests; however, in the main their answers were sketchy. However, sufficient information was received to make a broad analysis.

Corridor Demand

The demand on National Forest lands to supply corridors for transportation and utility corridors is not great. Much of the basic system had already been developed before the land was purchased for National Forest purposes. As a result, interests in the land for right-of-way purposes was already established and so do not come under the jurisdiction of the Forest Service. Largely, these rights-of-way constitute encumbrances in the Forest Service purchase deeds.

It is the opinion of the Forest Service that the highway, railroad, pipeline and communication systems are well established and that very little future development will take place on National Forest lands for bulk transportation and utility systems. The reasons for this feeling are:

-- The isolated character of National Forest enclaves in the overall land mass of the eastern United States. Since for the most part, these National Forests are purchased, they do not constitute large blocks of lands such as in the West where the National Forest systems were carved out of the public domain.

-- For the most part, the eastern National Forests are in the upland or marginal land areas of the East. Construction costs under these conditions are much higher than they are in at lower elevations and in areas of flatter topography or where geomorphy is more suited to construction, operation, and maintenance of these facilities.

-- The locations of the National Forests do not intervene, for the most part, between the sources of supply and demand.

-- Legal, institutional, and other similar situations tend to divert these facilities around the National Forests. "Wheeling" requirements in power is an example. It is reported that private power companies will divert construction around National Forests lands rather than to be bound by the wheeling agreement requirement. There is one case in the Eastern Region where a power company had no alternative than to cross a National Forest and, as a result, instituted a land exchange with the Forest Service rather than to come under this requirement. There are also indications that the National Environmental Policy Act and internal Forest Service policies and project analysis requirements have a limiting factor on the use of these lands, for the present time at least. Since a development outside these lands does not come under this scrutiny, with its accompanying time lags, the developer feels that he is in more command of the situation and will not become involved in this constraint, if there is any reasonable alternative.

From 1968 to 1973, according to a survey made in the Eastern and Southern Regions of the Forest Service, fifteen power permits over 115 KV have been issued and fourteen pipeline permits 20 inches and over have been issued. The bulk of the pipelines in the Eastern Regions involved the Chippewa, Chequamegon, Hiawatha, and Ottawa National Forests in Minnesota, Wisconsin, and Michigan for crude oil and gas coming out of Canada and back into Canada. Northern Minnesota and Wisconsin and the Upper Michigan Peninsula constitutes a natural corridor for this development. In the Southern Region, the Mississippi National Forest accounted for the bulk the pipeline permits, since Mississippi is in a direct line from the Louisiana oil and gas fields to the industrial northeast

section. However, in reviewing a map of the pipeline in the State of Mississippi, the involvement of the National Forest land in the total pipeline crossing the state constitute only a very small fraction of the total. (See Exhibit 1 and 2).

From these exhibits, it can be seen that the main known projects include primarily power development. Only one of these appears to be a major transmission project of 500 KV or larger from a pump storage plant in Virginia to Washington, D. C. via the Shenandoah Valley. The remainder are intermediate transmission systems. It is presumed that this is not a complete list. Historical relationships between the Forest Service and the utility industry in the East shows that the Forest Service is normally the last contact made before the project is scheduled for development. In many instances, routes have already selected and rights-of-way purchased across private lands before applications are submitted to the Federal land management agency.

Corridor Discussion

Since this project started, an attempt has been made to define corridors. Dictionary definitions are inadequate within even the broadest concept of hypothetical meaning as presented by this study. To overcome this difficulty, it was determined some definitions must be developed to orient the report. Corridors are defined as "A strip of land or land allocation forming a passage way for any one or a combination of transportation and utility facilities, or for related purposes." It is noted that this definition does not designate a width, consequently corridors can be any width as long as they provide a passage way.

From experience and use, corridors can be placed in three categories.

Conceptual corridors. These corridors are the broadest classification and denote only a passage way from one point to the other. They may be very broad in character, often exceeding 50 miles in width. They may be established as a result of land use planning.

Planning corridors. These corridors have a definitive boundary usually not exceeding six miles in width, and may be as narrow as 2,000 feet wide depending on circumstances. They are primarily used to determine the most suitable strip of land, from a number studied, for a designated purpose or for multi-purposes within the "conceptual" corridor. A determination of termini must be established before these corridors can be studied and designated.

Design corridors. These corridors are very narrow strips of land seldom more than 1,000 feet wide, but in most cases, much more narrow. The project or projects are engineered into these corridors to determine the best location from a multitude of design variables. From the studies made in the East, the maximum width of these design corridors appeared to be 300 feet. Usually the limiting factor is visual, but other factors may be of equal importance. Studies in the East also indicate that multi-purpose corridors are comparatively short, seldom exceeding 20 miles in length, before they diverge from a common use corridor.

Right-of-way. As defined by Webster Collegiate Dictionary (1937), it is a "strip of land over which a public road is built, or the strip over which an electric power transmission line passes." From this definition and in practice, the right-of-way would be synonymous with a single use "design" corridor. In the case of single system or multi-system corridors, two or more rights-of-way may occupy a "design" corridor.

"Conceptual" corridors are properly a function of land use planning. "Planning" corridors are a function of transportation and utility project planning. Design corridors are a function of engineering, macro environment, social implications and economic consideration, and micro environment. Each is a refinement of the next broader classification.

Within the definitions developed, it was determined that this study would primarily address itself to abuting multi-use "design" corridors. This is confirmed in the study of the Act which called for the study and the study outline. (See Exhibit II). This may have far reaching implications in the conclusions to be drawn from this study.

General Corridor Relationships

In reviewing the study outline, it is apparent that many of its parts can be included in a generalized discussion since the items, in some instances, span the full spectrum of systems outlined.

Combinations of many types of systems into one corridor can be found in the East. There is no set pattern but given sufficient space, all the various types of utility and transportation systems are compatible in a single corridor. The most common, however, are single system corridors with various sized facilities within the corridor. Corridor design by the Forest Service policy and its planning process first explores the possibility of expanding existing single use corridors or rights-of-way into multi-use corridors. To some degree, this is usually successful for a portion of the project, but there is seldom a case where projects can parallel each other the entire length of the projects or even major portions of the project. Controlling factors within the National Forests and elsewhere are the points of generation and use. This is usually controlled further in intermediate systems by the location of substations, pumping stations, or other points of distribution. Very seldom will bulk commodities originate at the same point or their ultimate point of use will coincide with another commodity. When they come in to a paralleling proximity, a chance is presented where they can share a common corridor. To make such a common corridor system successful, say in the power industry, the location of switching and substations would have to be closely coordinated to achieve common corridor objectives. This probably at best is only a hypothetical situation since in real practice the location of these facilities is largely dependent on distribution systems to the customer. The same rationale can be used for any utility-transportation or utility-utility mix which might be contemplated. No matter what academic hope there may be for a completely integrated common corridor system, the point of generation and the point of use or distribution points will control whether bulk, intermediate, or distribution systems are contemplated.

Economics is and must always be a factor. Everything else being equal a straight line between two points is normally the most economical approach

to design. The cost of all types of transmission is increasing in the present economy. The various constraints imposed by the Forest Service, almost in every case, increase this cost. When environmental studies and resource protection dictate that a common corridor must be established and additional mileage is necessary to achieve this objective costs will raise. Also increased costs may be incurred by working in close proximity to another established utility. Take, for example, a pipeline is to be installed and it is determined that a power line must be designed into a common corridor. Normally in rocky soils tower footings or pole holes must be blasted. Because of the close proximity of the pipeline, this is not possible, since blasting may rupture the pipe or expensive protection devices be developed. The same example could be used in a single system pipeline corridor, unless both pipelines were installed as a single project.

No specific cost figures were found on which to base a quantitative analysis. Time did not allow discussions or research with industry. It is doubtful if much data could have been uncovered since, except for municipal corridor systems, corridor concepts and environmental practices are relatively new.

The relative strengths of policies between the states and the Federal was not investigated. According to the Forest Service, Vermont, New Hampshire, and North Carolina have passed land use laws controlling the utility industry. However, they indicated that several of the other states are contemplating similar legislation. Since the Forest Service has the greatest legal control and probably has a great deal of more experience in rural land planning and policy development than many of the State political subdivisions, greater control is possible at the Federal level in the area of corridor development than in other jurisdictions.

Model statues such as "The Prevention of Excuvation Damage to Underground Pipelines and Utilities" prepared by the Office of Pipeline Safety, Department of Transportation may have an influence on a State of its political subdivision in the development of common use corridor standards, if and when such a statute is passed.

Corridor System Development Constraints

Institutional and legal factors have exerted significant influence on the development of corridors. There are some factors which may not be evident in the past but which may have influences in the future. Assume, for a moment, that a system of "design" corridors are feasible and practical as a basic planning concept. Who will own control these corridors on private lands? If they are to be made available to all users and they create or impose an encumbrance on the land, some entity must assume the responsibility for the corridor. Under the law, the land owner must be compensated for the right to use his land for public or semi-public purposes. Therefore, a corridor right must be established and paid for at a fair market value for the established corridor. To give an indication of the cost of this, the following analysis is made. The Wall Street Journal in its July 14, 1969 issue, states there will ultimately be 1,000,000 miles of pipeline line in the United States. Assume that each pipeline will occupy a 50-foot spacing and that the maximum practical and environmentally and esthetically correct corridor would not exceed 200

feet, four pipelines could be designed into the corridor. (See Exhibit 9 and the pipeline Corridor Study Chippewa National Forest of this report, Case I). This would amount to 250,000 miles of pipeline corridors. Again assume that the going rate for underground facilities is $3 a rod and the corridor would be the equivalent of two easements, the rate would be $6 a rod for the corridor, this amounts to $1,920 per mile or a total of investment of $480,000,000 for pipeline corridors alone. Add to this the estimated 20,000,000 acres of land needed for overhead facilities by 1980[20], this cost become astronomical.

An established corridor system could have a marked social implication in the East. Most of the ownership is in small parcels, both inside and outside the National Forests. Corridors 200-300 feet or wider could completely change the utility of a small 20-25 acre patch of land, which in many cases afford the only source of income to a family. As an example, a 200 foot corridor in a 25 parcel could reduce the theoretical productive capacity of by 19 percent. Since many of these small farms are marginal, a reduction of this magnitude could completely eliminate the parcel as an economic unit, causing a relocation of the family.

As was noted earlier, much of the land in the East was purchased by the Forest Service with outstanding mineral rights. The exercise of those rights might negate the continuted integrity of an established corridor, if the mineral owner or lessee exerted their rights. Since the agency can only convey the rights which it owns, they must take this possibility into consideration when issuing easements or permits to the utility industry there by establishing corridors. All instruments issued by the Forest Service have revisionary clauses, which render them, in effect, a license to use its land for utility purposes. They do not convey any interest in the land, so if the mineral owner of lessee exerts his rights, the right of the licensee is subservient to the holder of the mineral right. This could have a delitescent effect on the establishment or continuation of designated corridor system on Federal lands in the East unless these rights were also purchased.

The question of who will be responsible or the division of responsibility in multiple use corridors is universal. The easements or permits, in all cases reviewed, contained a right-of-way management and protection plan. These plans on a single use right-of-way has an easy managerial solution. However, in a multiple situation the managerial situation becomes much more complex. Where multi-use corridors have been established, rights-of-way overlap to conserve space, in many cases. As a result, the two parties involved have a common responsibility for the same strip of land. If one party becomes dilatory in his responsibility, what legal recourse does the other have? As a practical matter, normally the administrator becomes the moderator in these cases, which often times results in an excessive administrative time to resolve. As corridors expand these conditions could become correspondingly greater, until corridor management becomes a significant part of the managerial time on the administrative unit. This problem could be partially resolved by making it a condition of the conveying document to develop memorandums of maintenance agreements or other similar instruments between all users within the corridor. All subsequent corridor users would be bound by the agreement already in force. However, the administration of the agreement would still be the responsibility of the land administrator,

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[20] "Joint Use of R/W's can Reduce the Cost of Service" Civil Engineering ASCE, March 1969, page 56.

since the agreement would be his requirement. The Forest Service has a vehicle by which, through a cooperative agreement with its permittees requires the deposit of funds by the cooperators to the Forest Service who can in turn use the deposited money to perform necessary maintenance work on the corridor. The exercise of this option would be dependent on the willingness of the Forest Service and its permittees to enter into such an agreement. It is a viable alternative to spending excessive administrative time in the administration of multi-use corridors.

Forest Service landscape architects have some reservations in the proliferation of use within corridors. This view can be expressed in the following statement:

> Repetition, i.e. adding a power line where one exists, is a method or principle of composition that is frequently used to increase contrast and rarely, if ever, reduces it. The original power line may, in itself, be a strong contrast to the characteristic landscape. This does not make it correct and most certainly does not make compounding it automatically acceptable."[21]

The landscape architects consulted generally consider that introducing additional systems into a common corridor increase visual impact mitigating problems at a doubling rate, i.e. the second addition increase the mitigation problems on the order of four times that of the first, the third addition eight times the first, etc. This theory is based both on the problems of increased opening widths in timber and the repetition factors for aerial plant referred to in the preceding quote. It can be seen that large complex single system corridors could quickly degenerate into corridor slums, which from the esthetic viewpoint would have a very negative effect on the environment.

Managerial Aspects of Corridor Development

To evaluate the esthetic effects of any program which alters the scenic viewing situation, the Southern Region has developed a landscape management handbook, published in September, 1973. This publication is designed to be used in conjunction with the publication "National Forest Landscape Management" Volume 1, published February, 1973 by the Forest Service (Agriculture Handbook #434). The principles and evaluation procedures are applied to all single purpose and the development of multi-purpose corridors in the two Eastern Regions. This process should eliminate the possibilities of over-development of "design" corridors. Note: A second publication, "National Forest Landscape Management" Volume 2, published April, 1974 (Agriculture Handbook #462) is a back-up reference to the Southern Region publication.

In reviewing various environmental analysis reports and impact statements the following conclusions were drawn in the development of corridors in the

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[21]Howard Orr Regional Landscape Architect, Southern Region, in an inter-office memorandum commenting on an environmental analysis concerning the development of a single system corridor, January 22, 1974.

East.

-- Corridor development, within certain limitations, indicate these developments enhance the big game and game bird wildlife habitat and, in general, improve their environment. No adverse effects on fishery environment are mentioned, except during construction. In most cases, this latter situation could be at least partially alleviated by proper precautions in protecting stream and river banks and through controlled construction in stream channels.

-- One case noted recreation enhancement through the development of way trails for snowmobiles. The others, in final selection, considered the recreation relationship as neutral as there was sufficient corridor planning flexibility to reduce or eliminate conflicts with developed recreation sites and areas. In areas devoted to dispersed recreation, the corridors were routed around the area to avoid any conflict with this management situation. One project crossed a proposed state classified wild and scenic river, but the analysis indicated that by proper design irrevocable impacts could be avoided. This crossing was necessary because of the location of point of use nad other alternatives would be uneconomical. It was felt this invasion of the proposed classification would not eliminate its possibility for classification.

-- In all cases, negative impacts would be felt on the timber resource, primarily through the loss of production capability. No mention was made to alternate timber production objectives within the right-of-way or corridor in any report. One case did mention that any additional systems into the proposed corridor would have no effect on timber, since the first right-of-way clearing had previously eliminated production.

-- All cases evaluated the effects on the esthetics associated with the corridor. In over half the cases, the report indicated that these affects could, at least in part, be mitigated. Landscape architects have questioned the balance of esthetic evaluations on Federal and private lands. In some instances recommendations have been made to give greater emphasis to this factor on private lands.

-- Soil and water protection has been evaluated in almost every case. Adverse effects were mentioned in each case, but through the use of proper construction and maintenance techniques, it was determined these impacts could be mitigated.

-- Only one analysis developed a relationship with the range resource. The report mentioned the enhancement to this resource, because of the revegetation measures that would be required.

Abandoned transportation systems such as highways, roads, and railroads, in many cases, revert to the party which originally conveyed the land parcel to the Forest Service at the time the right-of-way purchased, as a great number of the rights-of-way were purchased prior to government ownership, It was reported in the Southern Region that the Bureau of Outdoor Recreation is granting money for the purchase of rights-of-way from private land owners for hiking and bike

trails.

Inventories

An effort was made to secure a reliable inventory for the two regions. It was soon realized that this would take a great deal of man hours to accomplish, hours which were not available. The Forest Service's "Land Use Reporting" (LUR) system has not a sufficient breakdown of categories within any type to satisfy the minimum standards developed in the study outline, i.e. 115 KV power lines, 16-inch diameter pipelines, etc.

The Southern Region did provide a utility right-of-way inventory developed in 1970 which gives an indication of the impacts of power, communication, and pipeline systems in this region. A similar inventory was later secured from the Eastern Region. (See Inventories 1 and 2). The acreage of the net Federal forest lands in the Southern Region is 12,400,440.[22] As seen in Inventory 1, the area occupied by utility corridors is 23,873 acres or about 0.2 percent of the net managed areas of National Forest lands in the region. The Eastern Region, which has net of 11,337,889 acres is occupied by utility systems which total 5,241 acres or 0.05 percent.

An attempt was made to find some correlation between the coastal plain and mountain forests in the Southern Region to determine if greater right-of-way widths were required in the more difficult construction situations. Ranges in right-of-way widths were from 56.0 to 30.1 feet in the mountain forests and from 42.6 to 21.6 feet in the coastal plain forests. The average widths for the two are 40.5 and 33.5 feet respectively, a 21 percent larger width in the mountains than the coastal plains. No conclusions could be drawn from this relationship. One possible explanation is the side hill slope factor which requires greater and clearing areas than on level ground.

Specific Corridor Relationships

In addition to the preceding generalized discussion, each kind of system has its own corridor characteristics in relation to multi-use situations.

Highways. (See Inventories 3 and 5) Major highway systems crossing National Forest lands usually are encompassed by Travel Influence Zones. These are defined as "These are areas in which beauty, esthetic values, and water quality and usefulness are an important part of the environment and offer significant opportunities for existing, anticipated or planned use and enjoyment along existing and planned overland routes of travel."[23] Historically, the Forest Service has thought this zone to be unavailable for utility development. This philosophy is changing. The feeling is surfacing that since highways have created environmental disturbances, often of significant magnitude, that their corridors should be considered for other linear development

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[22] National Forest System, Areas as of June 31, 1973, Forest Service, U.S.D.A.

[23] Forest Service Manual, Chapter 2120, Section 2124, ED #1, dated November 9, 1971.

trails.

Inventories

An effort was made to secure a reliable inventory for the two regions. It was soon realized that this would take a great deal of time longer than necessary, which was not available. The Forest Service's Land Use Reporting (LUR) system has not a sufficient breakdown to substantiate an in any type to satisfy the minimum standards required in the study outline, i.e., its RV model items. Therefore, a major effort was

The Sequoia Region did provide a valid, "fishy-looking" inventory developed in 1970 which gives an indication of the impacts of power, communication and sanitation systems in this region. A similar inventory was taken from the Eastern Region. (See inventories 1 and 2). The average of the most Eastern Forest lands in the Southern region is 12,400,000 [illegible]. As seen in inventory 1 the area occupied by utility corridors is 21,525 acres, [illegible] 0.2 percent of the net measured area of National Forest lands. In the Eastern Region, which has lost or 17,327,000 acres [illegible] occupied by utility systems which total 5,500 acres or 0.05 percent.

An attempt was made to find some correlation between the Eastern, plain and mountain forests in the Southern Region to determine if greater corridor widths were required in the more difficult-to-protect areas. Ranges in right-of-way widths were from 50 to 200 feet in the mountain forests and from 125 to 175 feet in the coastal plain forests. The average widths for the two are 100 and 150 feet respectively, a difference largely owing to the mountains than the coastal plains. In stormy conditions could be down from this relationship. One possible explanation is the wide mill stage factor which causes greater damage and clearing areas than on level ground.

Specific Corridor Metabolism

In addition to the previously mentioned discussion, each area of access has its own corridor characteristics in relation to maintenance stations.

Highway. See inventories 3 and 7. Major highway system crossing National Forest lands usually are maintained by Travel Information Stations. These are defined as "areas or areas in which highway, esthetic, and water quality and beautification are important part of the maintenance and operational objectives for existing, abandoned or proposed [illegible] and [illegible] along existing and planned corridors routes of travel [illegible]. Interpretive services have brought this soon to be conveniently in [illegible] areas. This emphasis is changing. The "motto" is satisfying what [illegible] highway have created environmental disturbances, often of significant magnitude, that their corridors should be considered for other linear development

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[1] National Forest System, Sierra as in June 1973, Forest Service, U.S.D.A.

[2] Forest Service Manual, Chapter 2100, Section 2120, [illegible], January-December 2, 1971.

purposes when in the best public, management and environmental interests. Some policy and direction change may have to take place before this philosophy is universally accepted.

The Department of Transportation and its Federal Highway Administration have set up very stringent safety requirements for utility occupancy of Interstate and major systems in their operating manuals. These restrictions impose limitations, especially on limited access highways.

Environmental planning and design for highways is extremely difficult, as it is for all surface and buried systems. Normally these system have very rigid technical requirements which limit the flexibility usually associated with aerial systems. Transportation systems grade limitations is much greater than for buried systems, which necessitates larger cuts and fills in construction. This factor and comparable construction restoration measures possible with buried systems are the principal differences between surface and buried systems.[24] In both cases, environmental and landscape impacts increase exponentially to the second power as rights-of-way increase in width. This relationship is not true with aerial plant, such as power transmission.

Major highways are planned and designed by the state highway departments. Normally much of the route planning and design is completed and before Forest Service officials are notified. In some instances, draft Environmental Impact Statements are well along before this time. (Environmental Statements are required since they are federal aid projects and normally, constitute major federal decisions. In corridor and design public hearings, required by the Federal Highway Administration, the State normally considers the Forest Service the same as any other land owner. The relations between State Highway Department and the Forest Service vary greatly from state to state. A memorandum of understanding between the states and the Regional Forester to improve these relationships (FSM 2732.6 and 2785.67) is suggested, but is not mandatory.

There are some specific social and economic situations resulting from the creation of major highway corridors. They include:

-- Change in the character of the land from rural or wild land to urban development.

-- Inflation of land values in the economic and use zone of the highway.

-- Development of demand for second homes and increased recreation opportunities and demand.[25]

Railroads. (See Inventories 4 and 6) Railroads traverse many of the

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[24]Buried systems can be divided into direct plow and trenched systems. Direct plow systems create very few environmental impacts and engineering planning and design is very flexible. Trenched system, depending on size, creates essentially the same impact as roads and highways, especially in forested areas. These impacts may be softened with time and by revegetation measures. This, or course, is not possible with highways and railroads.

[25]Notes taken in discussions with Eastern Region personnel.

National Forests of the East. Except for one or two exceptions, they all are on fee rights-of-way (though inside the Forest boundaries) which eliminates any jurisdiction by the Forest Service in corridor management. These exceptions are in the Missouri National Forests (Clark) and the Daniel Boone National Forest, Kentucky. Both lines were constructed to accommodate the mining industry.

Many old logging railroad beds have been abandoned in Minnesota, Wisconsin, and Michigan. These were all short lines and spurs, which for the most part, have been abandoned, but are now being used for all terrain vehicles, snowmobiles, and biking trails for recreation purposes. In all probability, this is a higher use for these abandoned rights-of-way than for transportation and utility transmission systems.

Historically, railroads have been very adverse to the use of their rights-of-way for any other purpose than for trackage or facilitating systems. Damage liability is the most often cited reason for this position. There are, however, possibilities for using railroads as a base for corridor developments, provided sufficient spacing from the railroad is designed into the corridor. This is well demonstrated by the existing joint multi-use corridors involving highways, power, pipeline, and communication systems.

Power Transmission

A complete inventory of 115 KV lines and over could not be secured in the time available.

The power transmission systems developed are largely 34.5 KV, 69 KV, 115 KV, and 161 KV systems. These are considered to be intermediate transmission systems. There is some trend toward 235 and 500 KV systems within the industry. It is not known if the eastern National Forests will become involved to any great extent in this development.

It is the policy of the Eastern Regions that all power lines below 34.5 KV will be buried. The lone exception to this policy is where the power company can prove burying is not reasible and if the Regional Forester concurs overhead lines may be constructed. There is a feeling that should the hardware become available at reasonable costs, this undergrounding policy will be expanded to larger voltages. This is not a universal feeling, however. It has some definite drawbacks since, according to the best information available, larger systems will have to have individual trenches for each phase. This would create the same problems that pipelines now pose.

Some design standards were found during the research for this report.

Exhibit 3

REA Clearing Standard - Bulletin 80-8

The basic standard is two inches per kilo volt beyond the outside line conductor's extreme side, sway position at the center of the span.

Clearing Distances

KV	Feet
33	5.5
66	11.0
115	19.2
161	26.8
230	38.3
345	57.5
560	93.3

It is interesting to note that the limitations imposed by the Acts of 1901 and 1911 where rights-of-way are limited to 50 and 200 feet respectively that only the smaller lines could be accommodated in the specified Act of 1901 rights-of-way. For instance, the maximum clearing distance for a 69 KV power line is 43 feet according to this standard and a 161 KV line would need a 84.6 foot clearance.

Exhibit 4 illustrates the standards proposed by an applicant for the development of a single system corridor for 161 KV and 69 KV transmission systems.

Exhibit 5 shows recommended vertical clearance standards above different kinds of situations.

A reference list for other standards can be found in Exhibit 6. These lists were prepared by the Eastern Region for the Appalachian Management Standards, but is applicable in many other situations.

Probably the single most important institutional factor is the wheeling requirement for transmission lines 33 KV and larger. (36 CFR 251.65 and Memorandum of Understanding dated March 5, 1964 between the secretaries of Agriculture and Interior). This requirement is imposed in all states in the East where there are National Forests except for the states of Illinois, Indiana, Maine, Michigan, Mississippi, New Hampshire, New York, Ohio, Pennsylvania, Tennessee, West Virginia, Wisconsin, and Vermont. (FSM 2728.12c) See Exhibit 7 for wheeling stipulations. Private power companies are for the most part adverse to signing these stipulations. This results in by passing national forests rather signing the stipulations. Public power companies are less concerned with wheeling, and so prefer the use of forest land, all else being equal. Wheeling requirements create problems in developing optimum "planning" and "design" corridors in either case.

Major Communications

It is difficult to obtain an accurate estimate of major communication systems from Forest Service records. Information received from the National Forest included all types of systems, including distribution and customer service lines. The Forest Service records do not show any differentiation. From the records of the various telephone companies, inventories may be possible to obtain, but past experience has shown that they are not entirely accurate.

Largely the newer systems are buried cable and except for a very few instances in rural areas, they are installed by "direct plowing." That is, the cable trench is constructed, the cable laid and backfill accomplished in one operation. This construction system is very flexible, resulting in very little disturbance to the soil, resources, or environment. Locations which have been previously disturbed, such as road shoulders, road beds of low standard roads, or abandoned road and railroad beds, are generally favored construction locations, This, of course, develops common corridors by intent and preference.

Buried cable has probably the least effect on land use planning and environmental factors of any utilities. The long and short term effects are minimal, and its flexible installation characteristics make it thoroughly compatible with these factors.

Micro-wave communication systems, if properly planned, can be developed in existing corridors of all types, Wire and cable systems are apparently compatible with pipe, power, and highways corridors. The degree of separation could not be determined in this study. Electrical interference, and ionization and electrolysis of buried "plant" appear to be the major compatibility considerations. The new American Telephone and Telegraph wave guide system will have a bearing on future corridor planning and design. This system, because of its inherent electronic characteristics, will be difficult to fit into multi-system corridors since the system must have nearly a straight tangent, and the degree of bending must be very shallow. While the system is operational, no construction has taken place at this time. From information made available to date, this system will require single use corridors because of the construction cost factors and its unique installation design characteristics.

Wire facilities, from a transmission stand point, have very little relationship to national defense. Defense communication systems are, for the most part, micro-wave systems. Thus, the security of these installations are of paramount importance. For this reason, transcontinental systems have high level security system built into each station location. Maintenance and reliability standards are very high in this system. This causes some problem in site location relative to established transportation systems. Visually, micro-wave towers have a low compatibility rating in and along transportation corridors which are zoned for esthetic purposes, such as Travel Influence Zones.

Pipelines

The Eastern Regions of the Forest Service are involved in two broad pipeline corridors. One is the Minnesota-Upper Wisconsin-Upper Michigan area and the other, the Louisiana-Mississippi area. The northern corridor is conncected with Texas and Louisiana supplies going into the midwest and eastern consumer points. Both regions, however, feel that the major pipeline systems are well set and future demands for this use will be minimal.

Locally, some forests such as the Allegheny National Forest in Pennsylvania, is heavily involved in oil and gas production. As a result, the

forest has a complex pipeline and pumping station system. (See Figures 1 and 2). Other forests involved heavily in oil and gas production are the Kisatchie National Forest, Louisiana and the Monanghela National Forest in West Virginia. The latter forest has a large (50,000 acre) gas storage facility which requires the same basic pipeline system as does a production field. The Allegheny National Forest has seven such fields. (See Figure 3).

Forest Service officials report both subsurface and surface pipe laying techniques being used. Apparently there are two factors involved. One is preference on the part of the pipeline developer. This situation occurs mostly in cases where the Forest Service has no control of construction methods. Surface pipelining is also practiced over swampy areas, (See Exhibit 8)[27] or in forested areas where right-of-way tree clearing would be detrimental to the forest environment.

Some information is available on construction specifications, which may be of interest. It is not complete, but merely is information gathered from Forest Service files.

1. Slurry pipelines have a maximum vertical grade of 13 percent. Betchel Company to Forest Supervisor Ouachita National Forest December 19, 1973.

2. 75 feet appears to be the minimum construction right-of-way requirement (See Exhibit 7).

3. Sharp pipe bending causes weakening in pipe walls. Cost factors are higher where bending is required because of special fabrication is necessary to offset the weakening of pipe walls.

4. Maximum bend in 16-inch pipe is 1 1/2° per two feet.

5. A minimum of 20 feet separation between pipelines is required in single system corridors. In addition, construction widths of 50-60 feet are required for each additional system.[28]

6. Normal depth for 30-inch pipe is 26 inches. A depth of 48 inches is required in river gully and non-surfaced road crossings.[28]

7. Gas lines carry transmission of 700 to 199 psi. Under these pressures, pipe may rupture for distances up to 0.5 miles when faults occur.

8. Looping is a practice to maintain pressure and volume. Loop lines can be placed at 15 foot intervals. Loops may occupy 50 foot R/W, but additional construction space is needed. Looping results in an equivalent of two to three pipelines, in which case a 50 feet R/W may become insufficient. Spacing must take this factor into consideration.

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[27]Boetler, D. H. and Lose, G. E. "Pipelines in Forested Wetlands" Journal of Forestry Volume 72, No. 9, September, 1974.

[28]Corridor Study Chippewa National Forest, 1966 et al.

forest has a complex pipeline and pumping station system. (See Figure 1 and 2). Other forests involved heavily in oil and gas production are the Kisatchie National Forest, Louisiana and the Mammoth National Forest in West Virginia. The latter forest has a large 150,000 acre gas storage facility which requires the same basic pipeline system as does a production field. The Allegheny National Forest has seven such fields. (See Figure 3).

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6. Normal depth for 30-inch pipe is 26 inches. A depth of 46 inches is required in river gully and non-surfaced road crossings.[29]

7. Gas lines carry transmission of 700 to 1000 psi. Under these pressures, pipe may rupture for distances up to 0.5 miles when faults occur.

8. Looping is a practice to maintain pressure and volume. Loop lines can be placed at 15 foot intervals. Loops may occupy 50 foot R/W but additional construction space is needed. Looping results in an equivalent of two or three pipelines, in which case a 50 feet R/W may become insufficient. Spacing must take this factor into consideration.

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[27]Buetler, D. H. and Loss, G. E. "Pipelines in Forested Wetlands" Journal of Forestry Volume 72, No. 9, September, 1974.

[28]Corridor Study Chippewa National Forest, 1966 et al.

9. Pumping stations require communications and power systems.

Looping practices may make multi-system corridors impractical, unless the looping program may be forecasted. Multi-looping systems could take up a complete 200 to 300 foot "design" corridor. In such a case, corridor development management would have to be closely correlated in long range planning for a corridor included multi-system developments.

Environmentally pipeline construction creates separate sets of impacts depending on the biomes crossed, terrain and geomorphy remaining constant. In forested areas, the impacts are the greatest. The lack of flexibility in design and the need for complete clearing of vegetation creates the major impacts. Experience has shown that undulating right-of-way clearing is impractical. If this design criteria is used, clearing is necessary considerable distances beyond the actual construction area. This to a large degree, destroys the effectiveness of this clearing technique. The net result are long, straight tangents, parallel sided clearings devoid of all vegetation, except for grass or shallow rooted brush. This is a good practice from the stand point of game management, but is detrimental to the visual environment. Tree planting in the operational and maintenance right-of-way is usually avoided.

Across grass and shrub types, many of these impacts are minimized. Especially in the Eastern part of the country where growing conditions are favorable. Excellent and rapid recovery of construction impacts are possible. This is especially true when revegetation and soil stabilization measures have been taken.

Oil spillage and escaping gas appear to be the primary safety considerations in developing pipeline systems. Oil spillage is highly detrimental to the environment because of soil and water contamination. The Environmental Protection Agency is much concerned with this problem, as is the Forest Service. As a result of this concern, the Forest Service requires a "Contingency Oil Spill Plan" for each pipeline system. Some regional guidance for its development is given in an inter-regional memorandum dated December 3, 1974. (See Exhibit 10). Escaping gas associated with static electricity in multi-system corridors is of concern in compatibility design of these corridors. William M. Byers, Chequamegon National Forest, in a letter to the Regional Forester dated December 24, 1974 states:

> "They (the gas transmission companies) stated that to place electrical transmission lines next to gas lines increases the risk of explosion. This sounds reasonable to us but has never been confirmed or refuted by any engineering specialist, to our knowledge."

There has been no expression regarding the necessary concentration of gas required to cause an explosion from electrical ignition.

Pumping stations, from the stand point of noise pollution, create unfavorable environmental impacts both in urban and rural areas. It has been reported that the noise from these installations can be heard for distances up to four miles on level ground and have a db equivalent to jet aircraft.[29] If this information is correct, it is readily apparent

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[29] Ibid Footnote 28

that the impact on the wildlife and recreational environments would be of some magnitude and would require special planning to mitigate this impact to the greatest possible degree.

Pipeline systems were found in common corridors with state primary and secondary systems and power systems. In most cases, there was a separation between rights-of-way. Normally these common corridors were comparatively short distances, seldom exceeding fifteen miles. They have a pattern of divergency and re-routing into the common corridor in instances where the systems parallel each other for long distances. This factor is probably the result of technical or planning requirements. Separations of 3-5 miles were noted before returning to the common corridor. As has been stated previously, corridors are kept as narrow as possible in the Forest Service jurisdiction. The rationale for this is to gain the maximum benefits from game, animal and bird management, retaining a manageable stand of timber between corridors and for esthetic purposes.

Other Systems

Only one other type of development of any magnitude was noted. This is the Holly Bluff Cut-Off Water Way located on the Delta unit of the Mississippi National Forests. This four-mile barge canal is located entirely on National Forest land. No other information is available.

Projected Demands for Transportation and Utility Systems

Little is known about the demand. This factor was discussed thoroughly at both regional offices, but the results were all but negative. Industry is not divulging their plans and there appears to be a reluctance on the part of industry to communicate in this area. According to Forest Service officials, this has been the history of their relations with industry and foresee very little change being made.

This was discussed at some length with Mr. Richard Thorsell of the Edison Electric Institute and Mr. Charles Winn, Tennessee Valley Authority at a discussion meeting with power representatives in Denver on January 17, 1975. Consideration of the Forest Service planning process and other influence is an important part of their planning when Forest Service lands are involved. An attempt was made to impress on these gentlemen that this will become an important factor as land available for development becomes more restricted in the future. This concept concerns not only power, but also the other utilities and transportation systems.

Another concern is the understanding of the corridor concept by the public. There is much confusion as to what a corridor is and its relationship to the ground which will ultimately be occupied by a system. As an illustration of this, an article appeared in the Bemidjii (Minnesota). Pioneer newspaper under the date line of November 26, 1974 concerning a 500 KV project being proposed by the Ottertail Power Company. The public was very concerned with a "20 mile corridor for routing of high voltage power lines." (It is not known if this proposed project will cross National Forest lands). A reasonable assumption can be made that the power company was not intending to fill this

20 mile corridor with power lines, but merely was studying this area for possible alternatives.[30] However, the consequences were negative, and considerable effort in time and money will be expanded in arriving at a mutually satisfactory understanding. Had the public understood the concept, a great deal of trouble could have been avoided.

Generally, the same situations regarding utility and transportation planning will exist in the future as in the past. The possible exception to this is more extensive land use planning. The effects of this planning on utility and transportation systems is difficult to predict. Generally, land use planning systems to date, to not take this situation into consideration and so the long range effects cannot be evaluated. One element which appears to be an outgrowth of the system developed by the Forest Service, is to designate planning units and subunits where transportation and utilities systems will either be curtailed or eliminated completely. It can be seen that this concept may be developed into other systems as well. Urban green belts, historical sites and areas, national and state heritage areas and other similar types of land use designations already are being set aside as utility and major highway exclusion areas.

Section III

National Transportation and Utility Corridor Systems Feasibility

Single System vs. Multi-System Corridors

The concensus of opinion among Forest Service officials is the single system corridors are preferred to multi-system corridors. Experience with the two evidently has shown that a single type of system is easier to design. The occupants evidently have better mutual understanding of the other's problem.

Timing of construction is more critical in multi-system corridors than in single system corridors. It is generally thought that if two different utilities are to occupy the same corridor, those which will be placed underground should be in place before power development is undertaken. The reason for this is primarily safety. Constructing a major transmission pipeline takes large machinery capable of becoming engaged with the conductors of power lines. While on the other hand, if buried or surface developments are constructed first this safety factor does not exist.

It must be kept in mind, however, that buried plant can also become broken or ruptured during tower footing and pole digging operations. Since some systems are under high pressure, such as gas, fatal results could develop from breakage. To prevent this from happening and to prevent the cost of repair to buried plant should a "dig in" occur, it is imperative that an accurate "as built" survey be made of the buried facilities after construction is complete. Before additional construction is carried out, in either a single or multi-system corridor, all buried systems be staked along center line based on the

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[30] Ibid, :Conceptual" and "Planning" Corridors, glossary of terms.

"as built" survey.

Environmentally, there is little to choose between the single and multi-use system corridors, unless the esthetics along a major highway are considered. Proper planning and design by evaluation of the environmental and esthetic factors in conjunction with the progressive development of either type of corridor will control this factor. Proper planning and design should also take into consideration any necessary mitigating factors to offset undesirable impacts. Mitigation measures which cannot be taken care by planning or design must whenever possible, be resolved by landscape design or other supplementary techniques.

Corridor crossings are always difficult to resolve. For instance, two power lines using the same construction standards, i.e. pole or tower heights, present special engineering problems to resolve the conflict. This problem is not as great with different types of systems, such as buried or surface vs. aerial systems. Esthetically there are problems due to the build up of cleared rights-of-way, at crossings, proximity standards, soil disturbance, etc. Again with proper planning and design many of these problems can be resolved.

There are no known legal or institutional factors in the Federal authority which would favor one type of corridor over the other. The problem comes in the private sector, where a corridor is owned by a single entity. The prime example of this is with railroads. They are very reluctant to have other systems invade their rights-of-way, either by paralleling or crossing. Since in the East most railroad rights-of-way are held in fee ownership, they have the legal authority to exclude utilities from their ownership, except when authorized by a legal document. As a result, the development of multi-use corridors is very remote in this instance. It is suspected that other owners of fee rights-of-way or corridors would be equally concerned in allowing systems, which they felt were not compatible, from using their property.

The Federal Power Commission (FPC) makes a power withdrawal on public lands when it grants a FPC license for primary transmission systems under its jurisdiction. For a time, the Forest Service felt that these withdrawals would eliminate the possibility of developing other systems within these withdrawn areas. The Forest Service in the Southern Region has issued permits for other systems in these withdrawals without adverse action on the part of the FPC. This is not a new factor in developing either single or multi-use system corridors in this Region.

In conclusion, single or multi-use system corridors are both practical and feasible, and there is little to choose between the two. Within the Federal jurisdiction in the East, once the need for additional systems has been established, planning and design through detailed analysis becomes the controlling factor. This involves both the expansion of established corridors and the development on new ones.

Conclusion

Presently the greatest number of corridors in the Eastern National Forests are simple corridors. When the need arises, simple corridors can be expanded

into a compound corridor through multi-discipline design. The existing simple and compound corridors form a basis for an expanding corridor system in the eastern National Forests. It should be emphasized that the presently developed corridor system does not constitute the ultimate system. This system will be enlarged both in numbers and size. The present corridor system is not capable of absorbing future needs. Corridor need factors include changing points of generation and use, system expansions, environmental capability of the existing corridors, changes in land use planning direction and needs, shifts in population patterns, changes in technology, economic situations, social adjustments and international trade agreements, to name a few influencing factors. The existing corridor system can only serve as a focal or starting for future planning.

There is a little to choose between single and multi-system corridors on Federal lands. Again, planning and need should dictate the development of either type. This may not be true in fee industry owned corridors.

By improved coordination through effective liaison, planning can be based on mutual objectives and not on the methodology used in the past. Neither party (public or private) can continue to live in isolation in this matter. To do so would be excessively costly in manpower and money, cause wasteful land use and create unnecessary impacts on the environment. These are the historical products of unplanned proliferating and individualistic development of utility and transportation systems. This is unacceptable, and the corridor concept is one methodology by which order may be created out of chaos. However, a word of caution is needed, one simple approach or concept cannot correct this unmanaged growth of transportation and utility networks. The problem is much too complex.

There is at least two alternatives which should be explored along with the corridor concept. If not alternatives perhaps they can be thought of as possible additions to the corridor development process.

The first and probably the most important is system planning. This involves not only the means of getting bulk energy or movement of people from one point to the other, but what intermediate transmission, distribution, and individual systems are needed. In the past, each development, no matter what part of an entire system was thought of only as a single project without regard to the whole. Little consideration was given to the points of distribution, interstate interchanges, and power substations or other connecting links as they related to the total land use planning impacts. These points of distribution are the key to effective transportation and utility planning. The highway or power line is merely a connecting facility. Yet these facilities have been and are being used as the focal point for planning as far as the land owner is concerned. If the point of generation and its accompanying distribution points were planned more thoroughly in conjunction with land use planning, it would be possible to develop the needed transportation system, whether it be a highway, a power line, or a pipeline, in a more orderly fashion, and reduce the impacts on land use requirements and the environment.

The other possibility is the increased system management within the existing corridors. In the past, when additional capacity was needed in any transportation system, the first thought was to look for a new location to build a bigger system. Little thought has been given to either build over-capacity into the planned project or to enlarge facilities to obtain

more capacity within the existing right-of-way corridor. It is realized that built in excess capacity is more expensive than building systems with coordinated need and load capacities, but it is possible when no other alternatives exist. A number of companies have already agreed to this approach, so it is economically feasible. Enlarging presents several technical problems during the change, a major one is the available supply during the change over period. Highway agencies have done this through a system of detours. Why is this not possible to use the same idea in the power industries when loop systems are being constructed or are now available for reliability purposes?

Industry is facing the probability and present fact that land resources are becoming less available for transportation and utility systems. Industry must come face to face with this proposition and be able to adjust their outlook to meet this changing condition. The land productive capability for goods and services creates a highly comparative land use allocation situation by high population per acre demand ratios,, as in the eastern National Forests, it does not take a great deal of imagination to realize that a scarcity of these lands to meet all the existing demands will be soon strained to the limit in the relative near future. The next step in the Federal jurisdiction is to be responsive only to need, and all other alternatives will have to be explored before the need can become established. Land use guides and plans already are expressing this concept in relation to utilities. Since over building and upgrading are two feasibility alternatives, industry will have to face these questions in the very near future.

All other corridor development factors remain constant at the present time. Environmental impact factors, to a large degree, by proper planning and design can be mitigated. Usually there is a solution to these unresolveable impact situations by improved design standards, changes in construction methods, landscape improvements, or affecting reasonable "trade offs." These special treatments cost money so they should not be considered as an alternative to good planning and design, but be considered as a last resort when, in the final analysis, no other alternatives exist.

A pre-establishment of wide "design" corridor systems could have an adverse affect on small ownership patterns in the East. In some cases, if a corridor is established, it would result in a complete relocation of the owner or tenant.

The cost of a pre-established "design" corridor if established, would be extremely high. The capital cost would be in the hundreds of millions of dollars in today's money market. Investment dollars can be put to better use when a "project development planning" approach would be equally effective.

Recommendations

1. The establishment of utility and transportation corridor systems should not be considered in the National Forest lands in the East. Feasibility and desirability is questionable. This statement is made within the corridor context presented in this study, that of "design" corridors.

"Conceptual" corridor systems should be developed as a result of land use planning. It will be some time before unit plans will be completed, but

sufficient safe guards are built into the Forest Service's planning and the environmental analysis system to bridge the gap. More attention to the altered management situation resulting from corridor expansion or development should be included in unit planning.

The basis for this is:

-- The lack of information of need or demand. Unless this factor is known land would be set aside for this purpose and possibly never be used. This would be adverse to multiple use principles and good land use management.

-- Insufficient information on the point of supply and demand. These factors are changing rapidly. New energy sources are being developed or about to be developed. Also the international energy is extremely fluid, as is the population migration. Scarcity of energy in one part of the country could cause migration to areas where more ample supplies exist.

-- The Forest Service planning system will provide ample control of the proliferation of land use needs for utility and transportation purposes. Effect and improved liaison between the Forest Service, agencies, and the utility system generate the greatest benefits to both parties. It would also be helpful if more attention is given to the corridor relationship in land use planning in unit and forest plans. This will require a greater awareness of industry needs and problems and corridor interaction with resource use and development and the environment in general.

-- A pre-planned system would have an undesirable effect on industry. They would be confined in their planning alternatives. As a result, the cost of the services would increase which would be born by the public in the form of taxes and higher use rates. From present trends, the price of energy will be going higher; this added cost burden should not be added to this spiral.

-- The location and size of the National Forest enclaves will have very little effect on the total right-of-way needs in the East if the past can be projected into the future.

2. Develop improved liaison programs between industry and the Forest Service and other land owners. Both entities must assume the responsibility for developing this coordination, and follow up at periodic intervals to insure continued relationships.

3. Industry improve its systems planning so that the full impacts on land use and on the area's social structure may be fully realized and incorporated into other planning systems, especially land use.

4. Develop methodologies where facility systems in a developed corridor can be upgraded and thus providing additional capacity without creating new land use impacts, or at the least hold these impacts to an absolute minimum.

sufficient data bases are built into the farmer structure. Samples and the environmental impact system to bring the story attention to the altered [illegible] should be included in [illegible].

The challenge for this is

- The lack of information of small or domestic [illegible] is taken into account in this purpose and [illegible] matter. This would be advisable to [illegible] and land use management.

- Insufficient information on the point of supply and [illegible] factors are dispersed. Many energy sources are [illegible] to be [illegible]. Alternative international [illegible] is extremely [illegible], as the population migration. Scarcity of energy in [illegible] of the country could cause migration in areas where more [illegible] facilities [illegible].

- The [illegible] planning [illegible] will involve single control of the [illegible] of land use needs for utility and transportation purposes. Effort and improvement liaison between the [illegible] authorities and the utility [illegible] operate the greatest [illegible] [illegible]. It could also be helpful if more attention is given to [illegible] relationship in land use planning in unit and forest [illegible]. This will [illegible] a greater awareness of industry needs and problems and [illegible] interaction with resource use and development [illegible] [illegible].

- A pre-planned [illegible] would have an [illegible] effect on the [illegible] would be [illegible] another planning [illegible]. As a result, the [illegible] of the services would increase which would be [illegible] by the public in the form of [illegible] and higher [illegible] rates. [illegible] the action [illegible] would be [illegible] [illegible] should [illegible] be added to this [illegible].

- The location and [illegible] of the [illegible] [illegible] [illegible]

5. Land use management agencies must consider corridor use and development as a valid part of their land use planning process along with other good and services which are included in these plans. Where it is determined that corridor development is a compatible use in a land planning unit determine what influence it will have on other resource management aspects of the plan.

6. Land use managmenet agencies view corridor development in a positive manner and that when a corridor needhas been established, they are equally responsive to the national welfare as timber, grazing, etc.

7. Consider corridor planning and design on adjacent and interior private lands equally with that done on public lands and reflect this in developing reports.

8. Create a better capability of understanding utility problems and needs within land management agencies. Industry acquire a better understanding of the problems associated with wild land management to better fit their proposals into the land need and a realization that land management direction will often change the optimum engineering and economics of utility and engineering design.

9. A better understanding on the part of government and the public that one approach to orderly development and land use conservation for utility and transportation is not the only answer. In actuality, the solution lies in a combination of approaches and that to retain a suitable flexibility political constraints should be held to an absolute minimum.

10. Create a better public understanding of the issues and problems involved in the development of utility and transportation resources.

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INVENTORY 1

RIGHTS-OF-WAY IN THE SOUTHERN REGION - R-8
(Excluding Transportation Rights-of-way)

June 30, 1970[1]

FOREST	STATE	POWER TRANS. LINES[2]		POWER DIST. LINES[3]		PIPELINES[4]		TELEPHONE LINES[5]		TOTAL		AVER. R/W WIDTH FEET
		MI	AC	MI	AC	MI	AC	MI	AC	MI	AC	
Alabama Forests	AL	97.0	711.6	84.6	321.5	6.9	43.9	31.7	59.5	220.2	1136.5	42.6
*Cherokee	TN	43.2	697.5	77.7	369.2	1.1	6.3	54.5	125.9	176.5	1198.9	56.0
*Daniel Boone	KY	64.5	971.4	171.5	671.9	17.9	105.5	64.2	157.2	318.1	1906.3	49.4
Florida Forests	FL	119.8	1385.0	345.6	1159.5	55.1	413.3	136.4	232.5	665.9	3190.3	39.5
*Geo. Washington	VA	29.6	593.9	122.1	368.1	35.7	195.4	60.1	109.9	247.5	1267.3	42.2
*Chattahoochee & Oconee	GA	144.2	598.6			9.2	45.9	112.7	369.8	266.1	1014.3	31.4
*Jefferson	VA	83.5	596.8			6.7	37.5	48.6	103.3	138.8	737.6	43.8
Kisatche	LA	275.0	908.0	55.0	542.0	130.0	750.0	60.0	70.0	520.0	2270.0	36.0
Mississippi Forests	MS	70.1	771.3	413.6	1211.6	196.7	966.3	260.3	236.2	940.7	3185.4	27.9
*N. Carolina Forests	NC	45.0	412.8	179.5	551.3	1.5	1.7	69.9	151.7	295.9	1117.5	31.2
**Ouachita	AR	15.0	271.0	280.8	2099.8	39.3	279.9	120.4	199.6	455.5	2850.3	51.6
**Ozark - St. Francis	AR	174.4	713.1	169.6	646.0	40.3	227.6	131.9	298.1	516.2	1884.8	30.1
Francis Marion Sumter	SC	22.6	3.0	190.5		29.4	129.8	116.4		358.9	132.8	
Texas Forests	TX	13.8	135.5	348.3	928.6	168.2	756.7	220.0	160.7	752.3	1981.5	21.7
TOTALS		1197.7	8769.5	2447.8	8869.5	738.0	3959.8	1489.1	2274.4	5872.6	23873.2	
Average Acres/Mile		7.32		3.62		5.37		1.53				
[6]Average Acre/Mile Less SL Forests		7.46		3.92		5.41		1.66				
Average R/W Width, Feet		61.50		32.30		44.60		13.70				

(1) Forest Service Manual, R-8 Supplement #23, May 1971
(2) 33 KV and over
(3) Less than 33 KV
(4) All sizes
(5) Largely buried cable or single pole, bracket systems for distribution
(6) S. Carolina Forests omitted from averages because of incomplete information
* Appalachian Mountain Forest
** Ozark Mountains Forests

INVENTORY 2

UTILITIES ON NATIONAL FOREST LANDS EASTERN REGION, R-9 (1)

Forest	State	Power Trans. Miles All NF ≠115 KV	Power Trans. Miles NF Lands ≠115 KV	Pipe Trans. Miles All NF ≠10"	Pipe Trans. Miles NF Lands ≠10"	Commun.* Miles All NF All Systems	Commun.* Miles NF Lands All Systems	Common** Corridors Miles	Remarks
Alleghany	PA	29	19	107	52	NE	115	N E	
Chequeamegon	WI	29	22	36	31	276	163	80	
Chippewa	MN	-	-	70	52	27	16	36	
Green Mtn	VT	21	-	15	3	69	-	72	
Hiawatha	MI	-	-	138	110	211	169	48	
Huron Manistee	MI) MI)	230	-	78	25	770	75	-	
Missouri NF's	MO	113	33	100	34	-	-	400	
Monagohela	WV	54	1	112	52	366	46	95	
Nicolet	WI	-	-	18	17	-	-	-	
Ottowa	MI	-	-	190	93	245	65	60	
Shawanee	IL	61	27	19	10	225	63	55	
Superior	MN	50	6	-	-	NE	54	200	
Wayne-Hoosier	OH & IN	240	28	270	57	495	54	33	
White Mtn	NH & ME	19	4	18	9	NE	22	19	
TOTAL		846	140	1311	545	(2684)	842	(1098)	
% of lines on NF lands inside boundary		16.5		41.6		31.4			
Assumed Acreages per mile based on Southern Region data		7.32		5.37		1.53			
Total Acres in R/W's	Est	6193	1025	7040	2928	(4107)	1288		

	Total NF land Occupied Miles	Acres
	1,527	5,241
Total NF Land, R-9	11,337,889 (2)	

*Probably the greatest proportion of these lines are distribution and customer service lines. Sources of information did not include only toll wire & cable systems.

**All combinations of common corridors including transportation and utilities.

(1) Source of table - Forest Supervisors, Eastern Region, Forest Service, USDA

(2) National Forest System, Areas as of 6/30/73. Forest Service, USDA

Bracketed figures inconclusive information NE = No Estimate developed

INVENTORY OF INTERSTATE & MAJOR PRIMARY HIGHWAY
SYSTEMS ON NATIONAL FOREST - SOUTHERN REGION, R-8

Note: Mileages rounded to nearest mile. Percentages from measured distances.

Forest	State	High Way	No. Miles on Forest Hwy	Total	No. Miles NF Lands Hwy	Total	% NF Occupancy	Remarks
Alabama	Ala	I 20	5		3		60	
		US78	3		1		33	
N F's		US82	4		1		25	
		US278	28		2		7	
		US29	14		1		7	Forest Highway 3
		US80	5		3		67	
		I 85	3		1		33	
		US29	8	70	5	17		
Cherokee	Tenn	US64	22		20		91	
		US25	14		-		0	2 miles along Forest Boundary
		I 40	12		2		17	
		US23	32		-		0	3 miles along Forest Boundary
		US19E	18		-		0	
		US421	48	146	12	34	25	6 miles along Forest Boundary
Daniel Boone	Ky.	-	12		3		25	Kentucky Parkway
		US460	10		-		0	
		US60	16		-		0	
		US421	12		2		17	
		US25	15		3		20	
		US27	29	94	10	18	34	
Florida	Fla	US98	3		-		0	
N F's		US319	11		-		0	11 miles along Forest Boundary
		US90	3		1		33	
		I 10	16	33	16	17	100	
G.Washington	Va.	I 64	43		15		35	
		US60	28		7		25	
		US250	18		6		33	
		US33	19	108	8	36	42	
Chattahoochee-oconee	Ga	128 US19	12		6		50	
		US129	4		1		25	
		US19	8		1		13	
		US76	93		11		12	31 miles along Forest Boundary
		US278	8		2	21	25	
		I 75	9		?		-	No Status
		US27	8	142	?		-	No Status
Jefferson	Va.	- - - - - - - No Data - - - - - -						
Kisatchie	La.	US165	15		-		0	12 miles along Forest Boundary
		US167	30		?		-	No Status
		US84	17	62	?	(-)	-	No Status
Mississippi	Mi	US84	7		2			
N F's		US98	23		5			
		US55	6		?			No Status
		US49	30		7			4 lanes
		US78	31		?			No Status
		US72	10		?			No Status
		US 80	19		2			No Status
		I 20	19		9			No Status

Forest	State	Highway	No.Miles on Forest Hwy	Total	No.Miles NF Lands Hwy	Total	% NF Occupancy	Remarks
Mississippi	(Con'd)	-	10		-		0	Natchez Trace Pkwy.PreN.F.R/W
		I 55	7	162	-	(25)	7	
N.Carolina	N.C.	I 40	25		14		56	
N F's		US70	37		7		19	4 lane,13 miles along Forest Bd.
		US221	48		4		8	12 miles along Forest Boundary
		US64	31		1		3	18 miles along Forest Boundary
		US64 19						
		129	6		1		17	
		US19 129	26		-		0	
		US129	30		11		37	
		US19	22		4		18	
		US441 23	30		1		3	
		US19A 23	19		-		0	
		US276	32		15		47	
		US251 70	19		6		32	4 miles along Forest Boundary
		US17	9		2		22	9 miles along Forest Boundary
		US220	4	338	-	66	0	4 miles along Forest Boundary
Ouachita	Ark.	US71	24		?			No Status
		US59 270	17		?			No Status
	Okla.	US59 270	16		6		38	
		US271	10		7		70	
		US259	5	72	-	(13)	0	2 miles along Forest Boundary
Ozark								
St. Francis	Ark.	- - - - - - - - -	N O N E	- - - - - - - - - - -				
Francis Marion	S.C.	US52	13		4		31	5 miles along Forest Boundary
		US17A	20		4		20	
		US17 701	26	59	8	16	31	
Sumter	S. C.	US76	12		4		33	Scenic Highway
		US221	28		-		0	
		US378	7		-		0	
		US178	6		-		0	6 miles along Forest Boundary
		US25	7	60	-	4	0	
Texas NF's	Texas	US81 287	13		-		0	4 lane
		69	15	28	3	3	20	

Total of available data 1,374 (270) ( ) Incomplete data

INVENTORY OF RAILROADS SYSTEMS ON NATIONAL FORESTS - SOUTHERN REGION, R-8

Note: Mileages rounded to nearest mile. Percentages from measured distances.

Forest	State	RR	No. Miles on RR	Miles on Forest Total	No. Miles on NF Lands RR	Miles on NF Lands Total	% NF Occupancy	Remarks
Alabama	Ala.	Sou.	4		1		25	
N F's		M&O	13	17	1	2		10 miles along Forest Bdry.
Cherokee	Tenn	L&N	30		20		67	2 miles along Forest Bdry.
		Sou.	18		-			
		Cl	20	68	2	22	10	6 miles common corridor w/ US23
Daniel Boone	Ky	C&O	16		3		19	In common corridor w/US60
		L&N	15		-		0	6 miles in common corridor w/US84
		Sou.	28	59	-	3	0	Pre Forest R/W 12 miles in common corridor w/US27
Florida	Fla	AN	17		16		94	
NF's		SCC	12	29	6	22	50	4 miles along Forest Bdry. 8 miles common corridor w/US90
Geo.Wash.	Va.	C&O	70	70	8	8	11	
Chattahoochee								
Oconee	Ga.	- - - - - N O N E - - - - - -						
Jefferson	Va	- - - - - N O D A T A - - - - -						
Kisatchie	La.	GSCF	5		-		0	
		MIP	15		-		0	12 miles common corridor w/US165
		CRI	31		?		-	No Status) Joint tracks
		KGS	27	78	?	(0)	-	No Status) for 27 miles
Mississippi	Miss.	MIC	27		-		0	7 miles in common corridor with US84
N F's		IC	52		-		0	Pre national forest R/W
		YM	12		-		0	
		SLSF	21		?		-	Common Corridor w/US78
		L&N	14	26	-	(0)	0	
N.Carolina	NC	Sou.	146		14		10	16 miles in common corridor with US19
N F's		ACL	9		-		0	Pre National Forest R/W
		A&EC	18	173	3	17	17	
Ouachita	Ark.	- - - - - NO D A T A - - - - - -						
	Okla	SLSF	21	21	4	4	19	
Ozark		- - - - - N O D A T A - - - - - -						
Francis	S.C.	C&WC	54		4		7	13 miles in common corridor with US221
Marion & Sumter		SCL	27		12			2 miles in common corridor w/US17A
		ACL	17	98	4	20	44	5 miles along Forest Bdry. in common corridor w/US52
Texas N.F.'s		GCSF	6		-		0	
	Tex.	FW&D	13		1		8	6 miles in common corridor with US287 & 81
		T&NO	17	36	2	3		12 miles in common corridor w/US69
Total of available data				775		(101)		( ) Incomplete data

KEY TO RAILROAD ABREVIATIONS

ACL - Atlantic Coast Line
A&EC - Atlantic & East Coast
AN - Appalachin Northern
CI - Clinchfield
C&O - Chesapeake & Ohio
CRI - Chicago, Rock Island
C&WC - Charleston & W. Carolina
FW&D - Fort Worth & Denver
GCSF - Gulf, Colo. & Santa Fe
IC - Illinois Central
KCS - Kansas City Southern
L & N - Louisville & Nashville
MIC - Mississippi Central
M & O - Mobile & Ohio
MIP - Missouri Pacific
SCL - Seaboard Coastline
SLSF - St. Louis & San Francisco
SOU - Southern
T& NO - Texas & New Orleans (SP)
YM - Yazoo & Mississippi

INVENTORY 5

INVENTORY OF INTERSTATE & MAJOR PRIMARY HIGHWAY SYSTEMS ON NATIONAL FORESTS

EASTERN REGION, R-8

Note: Mileages rounded to nearest mile. Percentages from measured distances.

Forest	State	Highway	No. Miles on Forest Hiway	Total	No. Miles NF Lands Hiway	Total	% NF Occupancy	Remarks
Alleghany	Penn	US219	28		14		50	
		US 6	48		9		19	
		US62	56	132	22	45	39	
Chequeamegan		US 2	4		4		100	
	Wisc.	US63	11	15	11	15	95	
Chippewa	Minn.	US 2	29	29	12	12	42	
Clark	Mo.	US63	8		0		2	
		US66	20		0		01	
		US60	14		5		34	
		US67	26	68	11	16	44	6 miles on Corp at England, 6 mi 4 lane
Green Mt	Vermont	- - - - - - -N O N E- - - - - - - - -						
Hiawatha	Mich	US 2	48		24		45	
		I 75	23		14		62	
		US 4	16	87	1	39	5	
Hoosier	Ind.	US50	8		1		10	
		US150	10		1		12	
		US460	14		2		14)	Common Corridor
		I 64	14	46	2	6	14)	I-64 Proposed
Huron	Mich	- - - - - - -N O N E- - - - - - - - -						
Manistee	Mich	US31	18		-		0	
		US10	28	46	6		21	
Mark Twain	Mo.	US60	24		6		25	
		160	14	38	8	22	54	
Monongahela	W.Va	US219	62		6		10	
		US35	30	92	5	11	16	
Nicolete	Wisc.	US 8	18	18	1	1	3	
Ottawa	Mich.	US 2	66		30		46	
		US45	33	99	14	44	43	
Shawnee	Ill.	US51	8		-		0	
		I 57	8		-		2	
		US45	18		-			
		I 24	10	44	2	2	15	Proposed
Superior	Minn.	US61	41		2		4	Along Shore Lake Superior
		US53	16	57	4	6	25	2 mile 4 lane
Wayne	Ohio	US50A	8		-		0	
		US33	15	23	2	2	12	
White Mtn	NH & Me	US 3	8		8		100	
		US302	10		2		23	
		US 2	14	32	2	12	14	Follows F.S. Bay from Graham N. H. to W. Bethel, Me.
TOTAL			826		233			

INVENTORY 6

INVENTORY OF RAILROAD SYSTEMS ON NATIONAL FOREST - EASTERN REGION, R-8

Note: Mileage Rounded to nearest mile. Percentages from measured distances.

Forest	State	RR	No. Miles on Forest Line	Total	No. Miles NF Lands Line	Total	% N F Occupancy	Remarks
Allagheney	Penn	P.C.	48		9		18	Common Corridor w/US6
		B&O	5	53	34	45	61	
Chequeamegon		CNW	12		8		66	
	Wisc.	BN	4	16	4	12	100	Common Corridor w/US2 for 0.8 miles
Chippewa	Minn.	CNW	29	29	12	12	42	Common Corridor w/US2
Clark	Mo.	SL&SF	8		-		0	
		MP	20	28	2	2	12	
Green Mtn	Vermont	- - - - - N O N E - - - - - - - - -						
Hiawatha	Mich	SOO	127		65		51	4 miles in common corridor w/US2
		LSI	9	136	6	71	72	
Hoosier	Ind.	SOU	16		-		0	
		B&O	8		-		0	
		CMSP	11	35	-		0	
Huron	Mich	- - - - - N O N E - - - - - - - - -						
Manistee	Mich	C&O	26	26	3	3	12	9 miles in common corridor w/US10
Mark Twain	Mo.	SL&SF	26	26	-		0	
Monogahela	W.Va.	WM	94		35		37	10 miles in common corridor w/US219
		C&O	48	142	8	43	18	
Nicolet	Wisc.	CNW	64		24		38	
		SOO	12	76	2	26	17	
Ottowa	Mich	SOO	52		12		23	
		CMSP	28		22		77	
		CNW	74	154	34	68	46	
Shawanee	Ill.	IC	24		6		25	
		GMO	14		4		25	
		BN	6		-		0	
		IC	7		1		11	
		MC	6		0.5		33	
		PC	20	77	-	11.5	0	8 miles in common corridor w/US45
Superior	Minn.	- - - - - N O N E - - - - - - - - -						Forest has a great number of mining railroads
Wayne	Ohio	B&L	18	18	-		2	
White Mtn	MH & ME	MAC	10		2		23	
		GT	N O N E					Follows US 2 outside Forest Bdry
		B&M	11	21	3	5	30	9 miles from Bdry of Forest
TOTAL			837		298			

B & M - Boston & Maine
P.C. - Penn Central
BN - Burlington Northern
IC - Illinois Central
SLSF - St. Louis & San Fran.
LSI - Lake Superior & Ishpeming
GT - Grand Trunk Line
B & O - Baltimore & Ohio
C&O - Chesapeake & Ohio
MAC - Maine Central
MP - Missouri Pacific
SOU - Southern
GMO - Gulf, Mobile & Ohio
CNW - Chicago-Northwesterr
WM - Western Maryland
MC - Missouri Central
SOO - Soo Line
CMSP - Chicago, Milwaukee & St. Paul

EXHIBIT 1 - PERMITS ISSUED FOR POWER PURPOSES 1966-1973

FOREST	KV	R/W WIDTH FEET	INSIDE NF BOUNDARY DISTANCE NF MILES	DISTANCE OTHER MILES	TERMINI	REMARKS
			EASTERN REGION			
Clark	161	100	4.00		Salem & Ft. Leonard Wood	54 miles long
Shawnee	161	100	6.16		Marion, IL - Gilbert, KY	25 miles long
			SOUTHERN REGION			
Daniel Boone	161	40-100	11.00	.03	Local REA Dist. Co.	48 miles long
Florida	115	100	6.13	none	Pamona Pk, FL	
Florida	115	100	32.30			40 miles long
Geo Washington	250	110	3.31		Waynesboro to Edinburg,VA	55 miles long
Mississippi		100	6.02		Moselle MS to State Line	59.4 miles long
Mississippi		100	11.55		Moselle - Columbia, MS	148 miles long
Mississippi		100	7.80		Moselle - Decatur, MS	77 miles long
Mississippi		100	1.06		Magee - Lillina, MS	48.8 miles long
N. Carolina		70-100	6.90		Newborn-Cherry Point NC	16 miles long
N. Carolina		70-100	1.50		Skyland-Bernsville NC	
N. Carolina		100	0.40		Oak Grove - Bryson City,	11.8 miles long
Texas	138	100	3.37		Toledo Bend Reservoir/NC	7 miles long
			PLANNED & PROGRAMMED			
Florida	230	85-120	15.00	6.00	Hopkins Gen to Crawfordville	6 miles in Sub pipeline corridor
Geo Washington	230	100	0.89		Stuarts Draft - Dooms VA	12 miles total length
Geo Washington	230	120	4.50		Lawmoor-Lexington VA	Lower visual impact along US220 & use pipeline corridor across NF
Geo Washington	500	150	23.80		Pumper Storage to Wash.DC	In preliminary stages
Francis Marion	230	60	4.00		Pinoples - Columbia SC	100 miles long

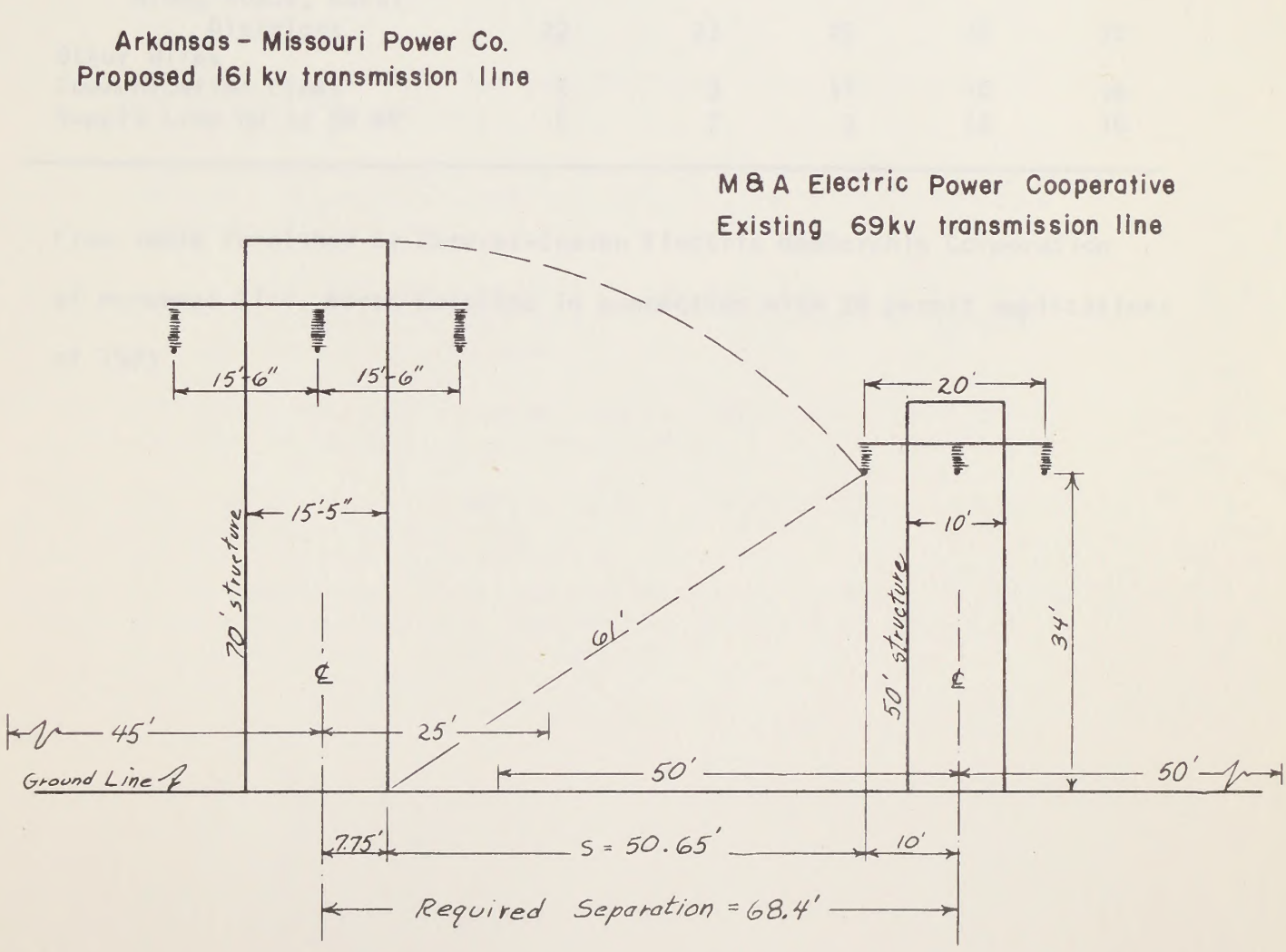
EXHIBIT 2 - PERMITS ISSUED FOR PIPELINE TRANSMISSION LINES 1966-1973

FOREST	DIA. INCHES	R/W WIDTH FEET	PRODUCT	INSIDE NF BOUNDARY DISTANCE NF MILES	DISTANCE OTHER MILES	TERMINI	REMARKS
				EASTERN REGION			
Allegheny	20	35-50	Gas	4.11	7.12	Roystone-WarrenPA	Adjacent to existing R/W
Chequamegon	36	50-75	Gas	9.00	2.00	Canada-US-Canada	Corridor Study in Report
Chippewa	36	50-75	Gas	15.00	15.00	"	"
Hiawatha	36	50-75	Gas	52.00	12.00	"	"
Ottawa	36	50-75	Gas	37.00	13.00	"	"
Chippewa	48	100	Crude	8.20	15.00	"	"
Chippewa	36	75	Crude	8.20	15.00	"	"
Menongahela	36	66	Gas	2.43		Texas to Wash DC & Baltimore	
Nicolet	30	20	Gas	16.95	1.05	Local & Milwaukee	
Wayne Hoosier	36	100	Gas	6.43		Louisiana-Detroit	Common corridor
Wayne Hoosier	30		Gas	6.43		Louisiana-Detroit	Common corridor
				SOUTHERN REGION			
Alabama		75	Pet.	1.10		Unknown	Along line
Chattehoochee		50	Gas	4.90		Unknown	100 mi total length
Mississippi		55	Crude	11.66		Texas to Florida	
Mississippi		80	Gas	2.91		Offshore LA to Ashland KY	
Mississippi		55-90	Crude	22.48		Louisiana to NY City	
Mississippi		50	Gas	8.93		Jackson MS to Philadelphia & MS	90 mi total length
Ouachita	30	75	Coal Slurry			Gillette WY-Little Rock, AR	Preliminary discussion stage

Exibit 4

ARKANSAS - MISSOURI POWER COMPANY

Proposed 161/138 kv Line from Viburnum to Fletcher Mine
Parallel to M & A Electric Cooperative 69 kv Line



SCALE: 1" = 20'

Exhibit 5

Recommended Minimum Vertical Clearances

In Feet Above Ground of Rails

(120°F., No Wind, Final Sag. Conductor Design-Tension

50% of Ultimate Strength)

Nature of Ground or Rails Underneath	Voltage (KV)				
	34.5	69	115	230	345
Railroad Tracks	32	33	35	38	42
Public Streets or Highways	25	26	28	31	35
Pedestrian Areas	19	20	22	25	29
Cultivated Field	20	21	23	26	39
Along Roads, Rural Districts	22	23	25	28	32
Other Wires					
Communication Lines	8	9	11	14	18
Supply Line Up to 50 KV	6	7	9	12	16

From table furnished by Cateret-Craven Electric Membership Corporation of Morehead City, North Carolina in connection with 20 permit applications of 1973.

Exhibit 6

Eastern Region's Reference List for Power and Pipeline Planning

1. ENVIRONMENTAL CRITERIA - For Electric Transmission Systems. Joint USDA - USDI publication Superintendent of Documents.

2. Regional supplements to FSM 2700.

3. "Beautifying Power Transmission Lines" - Mr. Saylor's remarks - CONGRESSIONAL RECORD - November 24, 1969.

4. Engineering Technical Report ETR-7100-1, "Utility Transmission and Distribution Line - How to Assure Compatibility with Environmental Values." USDA - Forest Service - Division of Engineering - August, 1969.

5. Engineering and Operations - Manual for Rural Electric Systems - Distribution Line Design (Mechanical) USDA-REA Bulletin 160-2, July, 1969.

6. Underground Electric Power Transmission. Available from R-8, Division of Engineering.

7. Sample Maintenance Plan - Hells Canyon Pallette Junction - 230 KV Line. Region 6, Forest Service. Available from R-8 Lands and Minerals Division.

8. Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines - U. S. Department of Commerce - National Bureau of Standards.

9. R-8 Visual Resource Management Guide. Available from R-8 Division of Recreation and Watershed.

10. EHV Transmission Line Reference Book, Edison Electric Institute. 750 Third Avenue, New York.

11. Part II Department of Transportation Hazardous Material Regulation Board, Transportation of Natural Gas by Pipeline: Minimum Safety Standards; Title 49, Part 192.

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

STIPULATIONS

TO BE EXECUTED BY THE APPLICANT FOR SPECIAL USE PERMIT OR EASEMENT FOR TRANSMISSION LINES OF 33 KV OR MORE ON LANDS UNDER FOREST SERVICE JURISDICTION (36 CFR, PART 251 AS AMENDED ON MARCH 23, 1963 – FR 28-2903)

(1) In the event the United States, pursuant to law, acquires the grantee's transmission or other facilities constructed on or across such easement, the price to be paid by the United States shall not include or be affected by any value of the easement granted to the grantee under authority of the regulations of this part.

(2) The Department of the Interior (hereinafter referred to as the "Department") shall be allowed to utilize for the transmission of electric power and energy any surplus capacity of the transmission facility in excess of the capacity needed by the holder of the easement (subsequently referred to in this document as "holder") for the transmission of electric power and energy in connection with the holder's operations, or to increase the capacity of the transmission facility at the Department's expense and to utilize the increased capacity for the transmission of electric power and energy. Utilization by the Department of surplus or increased capacity shall be subject to the following terms and conditions:

(i) When the Department desires to utilize surplus capacity thought to exist in the transmission facility, notification will be given to the holder and the holder shall furnish to the Department within 30 days a certificate stating whether the transmission facility has any surplus capacity not needed by the holder for the transmission of electric power and energy in connection with the holder's operations and, if so, the amount of such surplus capacity.

(ii) Where the certificate indicates that there is no surplus capacity or that the surplus capacity is less than that required by the Department the authorized officer (as used in this paragraph "authorized officer" means of the Department of the Interior) may call upon the holder to furnish additional information upon which its certification is based. Upon receipt of such additional information the authorized officer shall determine, as a matter of fact, if surplus capacity is available and, if so, the amount of such surplus capacity.

(iii) In order to utilize any surplus capacity determined to be available, or any increased capacity provided by the Department at its own expense, the Department may interconnect its transmission facilities with the holder's transmission facility in a manner conforming to approved standards of practice for the interconnection of transmission circuits.

(iv) The expense of interconnection will be borne by the Department, and the Department will at all times provide and maintain adequate protective equipment to insure the normal and efficient operation of the holder's transmission facilities.

(v) After any interconnection is completed, the holder shall operate and maintain its transmission facilities in good condition; and, except in emergencies, shall maintain in a closed position all connections under the holder's control necessary to the transmission of the Department's power and energy over the holder's transmission facilities. The parties may by mutual consent open any switch where necessary or desirable for maintenance, repair or construction.

(vi) The transmission of electric power and energy by the Department over the holder's transmission facilities will be effected in such manner as will not interfere unreasonably with the holder's use of the transmission facilities in accordance with the holder's normal operating standards, except that the Department shall have the exclusive right to utilize any increased capacity of the transmission facility which has been provided at the Department's expense.

(vii) The holder will not be obligated to allow the transmission of electric power and energy by the Department to any person receiving service from the holder on the date of the filing of the application for an easement, other than statutory preference customers including agencies of the Federal Government.

(viii) The Department will pay to the holder an equitable share of the total monthly cost of that part of the holder's transmission facilities utilized by the Department for the transmission of electric power and energy, the payment to be an amount in dollars representing the same proportion of the total monthly cost of such part of the transmission facilities as the maximum amount in kilowatts of the power transmitted on a scheduled basis by the Department over the holder's transmission facilities bears to the total capacity in kilowatts of that portion of the transmission facilities. The total monthly cost will be determined in accordance with the system of accounts prescribed by the Federal Power Commission, exclusive of any investment by the Department in the part of the transmission facilities utilized by the Department.

(ix) If, at any time subsequent to a certification by the holder or determination by the authorized officer that surplus capacity is available for utilization by the Department, the holder needs for the transmission of electric power and energy in connection with its operations the whole or any part of the capacity of the transmission facility theretofore certified or determined as being surplus to its needs, the holder may request the authorized officer to modify or revoke the previous certification or determination by making application to the authorized officer not later than 36 months in advance of the holder's needs. Any modification or revocation of the certification or determination shall not affect the right of the Department to utilize facilities provided at its expense or available under a contract entered into by reason of the equitable contract arrangements provided for in this section.

(x) If the Department and the holder disagree as to the existence or amount of surplus capacity in carrying out the terms and conditions of this paragraph, the disagreement shall be decided by a board of three persons composed as follows: The holder and the authorized officer shall each appoint a member of the board and the two members shall appoint a third member. If the members appointed by the holder and the authorized officer are unable to agree on the designation of the third member, he shall be designated by the Chief Judge of the United States Court of Appeals of the circuit in which the major share of the facilities involved is located. The board shall determine the issue and its determination, by majority vote, shall be binding on the Department and the holder.

(xi) As used in this document, the term "transmission facility" includes (a) all types of facilities for the transmission of electric power and energy and facilities for the interconnection of such facilities, and (b) the entire transmission line and associated facilities, from substation or interconnection point to substation or interconnection point, of which the segment crossing the lands of the United States forms a part.

(xii) The terms and conditions prescribed in this document may be modified at any time by means of a supplemental agreement negotiated between the holder and the Secretary of the Interior or his designee.

(I) (We) have read the foregoing stipulations and agree to accept and abide by the terms and conditions.

DATE	NAME OF GRANTEE OR APPLICANT	SIGNATURE OF AUTHORIZED OFFICIAL
		TITLE

GPO 890-328

Reprinted from the JOURNAL OF FORESTRY
Vol. 72 No. 9, Sept. 1974

CROSS DRAINAGE NEEDED TO PREVENT TIMBER DAMAGE

Pipelines in Forested Wetlands

Don H. Boelter and Gordon E. Close

ABSTRACT—Large natural gas and petroleum pipelines that cross forested wetlands block normal water flow, raising the water table on the upslope side, which significantly reduces growth or even kills the trees. Such damage has been prevented on the Chippewa National Forest in north-central Minnesota by excavating ditches during construction to provide the necessary cross drainage.

The volume of unsaturated soil available for tree root growth in forested wetlands is limited by the relatively high water table. Thus, small but prolonged rises in water table can saturate the rooting zone, significantly reducing growth and even killing trees.

Examples of this kind of timber damage are common in the wetlands of the northern Lake States. Stoeckeler (*10*) surveyed 70 wetland road crossings where lack of adequate cross drainage resulted in higher water tables and timber damage on the upslope side. He estimated that there are about 30,000 acres of wetlands in northern Minnesota where trees are dead, crown vigor is markedly reduced, or natural regeneration is inhibited owing to periodic or permanent flooding adjacent to road crossings.

Similar flooding and timber damage can occur when large pipelines carrying natural gas and petroleum products are constructed across forested wetlands. This damage has been prevented on the Chippewa National Forest in north-central Minnesota by excavating ditches during construction to provide the necessary cross drainage.

Extent of Problem

Pipelines up to 48 inches in diameter are transporting natural gas and petroleum products from their source near Edmonton, Alberta (Canada) to consumers in the lower Great Lakes region (*Figure 1*). The route crosses northern Minnesota, Wisconsin, and the Upper Peninsula of Michigan, which have many forested wetlands. Since nearly one-third of the forest land in northern Minnesota is wetland (*2*), it is impossible for the pipeline to avoid these areas. The pipeline across the Chippewa National Forest is about 31 miles long, with 11 miles of wetlands. These wetlands range from poorly drained mineral soils to organic soils several feet thick.

Although this study and Stoeckeler's (*10*) observations of timber damage are limited to swamp conifer types in the northern Lake States, the potential for similar damage exists in many other areas. Proposed pipelines for transporting petroleum products from the north slope of Alaska no doubt will also cross wetlands, for Canada and Alaska have extensive acreages of organic soils (*4*). Damage to hardwood species and shrubs resulting from prolonged flooding have also been observed in more southerly regions (*3, 5, 8*). Further, flooding of nonforested wetlands would also result in significant changes in their plant communities.

Effect of Blocked Drainage

All or parts of six different pipelines currently cross north-central Minnesota. Evidence of blocked drainage and resulting timber damage can be found in several areas along these lines. One example selected for study (*Figure 2*) is a wetland area of shallow peat about 2,000 feet wide at the point where the pipeline crosses.

Studies have shown that water in organic soils such as this normally flows through the surface 18 inches or so. The less decomposed peat near the surface is highly porous and permits rapid water movement (*1, 2*). In contrast, little water flows through the more dense and decomposed peat materials at greater depths where hydraulic conductivities are often as low as 1.0×10^{-5} cm./sec. (0.02 feet/day), or similar to glacial till.

In the study area, a corduroy road built parallel to the pipeline is currently about 1½ feet higher than the normal swamp surface (*Figure 3*). The road effectively blocks water movement because the normally porous surface materials have been compacted and the corduroy and incorporated peat materials block flow through the road itself.

Water tables were observed on both sides of the road on 10 dates between April and November, 1972. The data show a consistently higher water table (0.68 to 0.86 feet) on the upslope side during the entire period (*Figure 4*). Even larger differences probably would have occurred had not shallow ditches eroded across the corduroy road at several points.

The trees in the area studied are primarily tamarack (*Larix laricina*) and northern white-cedar (*Thuja occidentalis*) with a scattering of black spruce (*Picea mariana*). Timber has been killed about ½ mile back from the pipeline. The extent of flooding damage upslope depends on the slope of the wetland surface and

THE AUTHORS—Don H. Boelter is research soil scientist, North Central Forest Experiment Station, Grand Rapids, Minnesota, maintained in cooperation with the University of Minnesota. Gordon E. Close is staff assistant, Chippewa National Forest, Cass Lake, Minnesota.

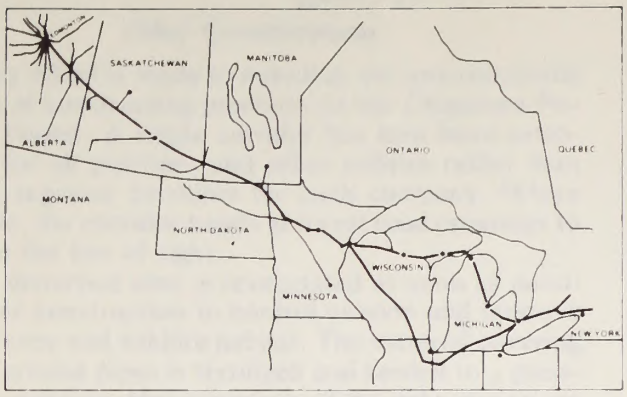


Figure 1. Route of major and minor pipelines. (Source: Brochure, Lakehead Pipe Line Co., Inc. and Interprovincial Pipe Line Co. The Great Lakes Pipe Line Co. system follows a similar route.)

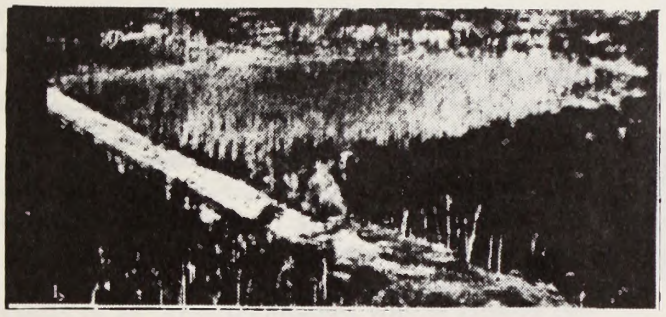


Figure 2. Dead trees (center) upslope from wetland pipeline crossing resulted from blocked drainage and accompanying high water table. (Four years after construction.)

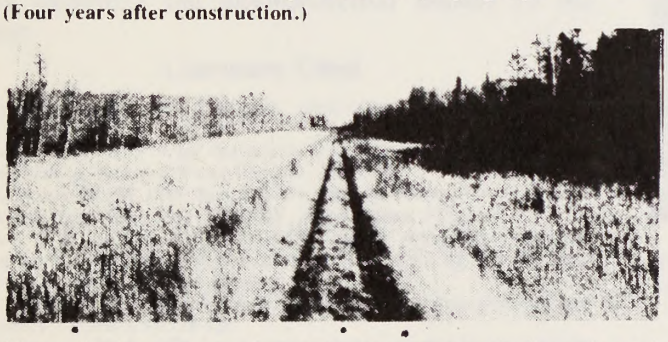


Figure 3. Corduroy road used in constructing pipeline effectively blocked normal water flow. High water tables upslope (left) killed trees.

the amount of water table rise. Heinselman (*6*) reports slopes of 2 to 6 feet/mile for most wetland types but as high as 15 feet/mile for a few.

Recommended Drainage

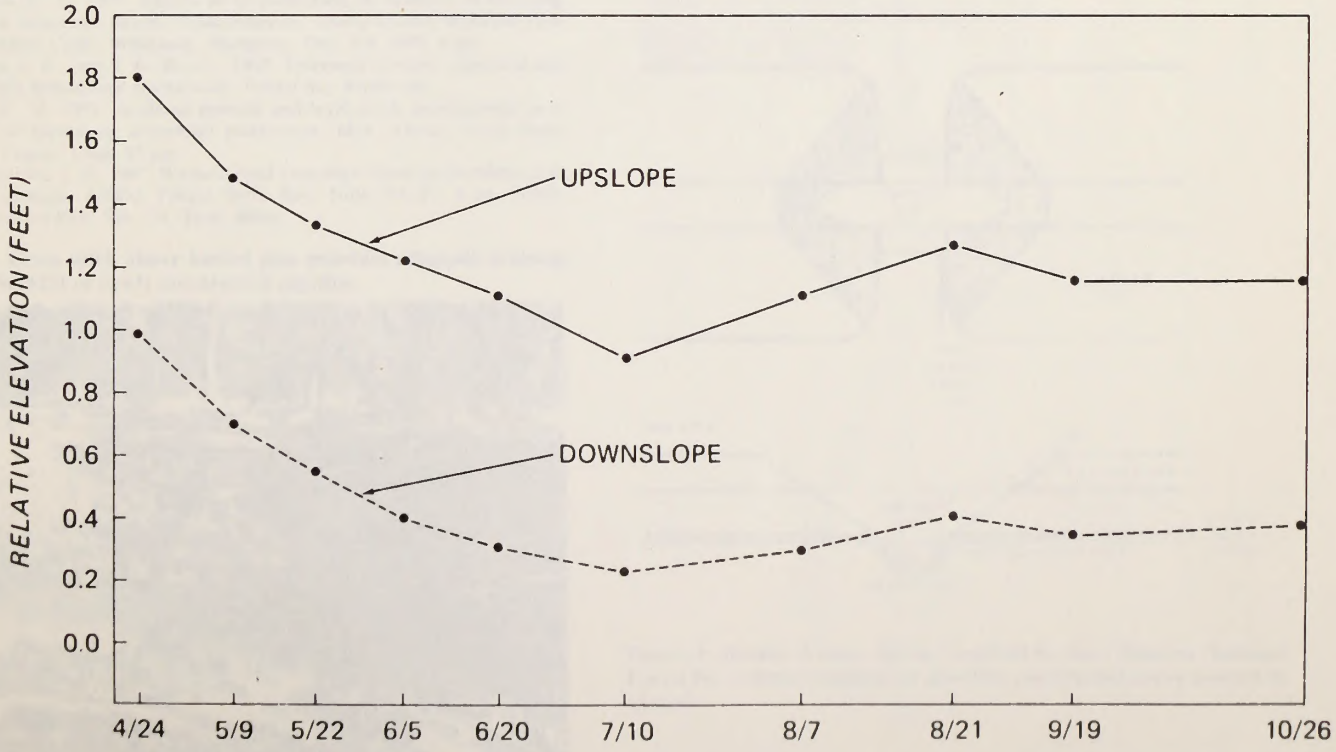
Several techniques are used to construct pipelines across wetland areas. Earlier pipelines were buried with the top of the pipe several feet below the ground surface. These pipelines were often constructed during winter when the frozen ground could usually support heavy equipment. Construction during summer required a corduroy road paralleling the pipeline excavation. Both the backfill and the corduroy road prevented normal flow of water.

More recently pipes have been laid on the ground surface and covered with excavated material. In this case both the pipe and its covering are expected to block water flow. However, whether the pipe is above or below ground, the Chippewa National Forest now requires the construction company to provide cross drainage every 150 feet or less.

Cross ditches for pipelines below ground are constructed through both the backfill and any corduroy road, and must be at least 18 inches deep to correspond to the depth of normal water flow (*Figures 5* and *6*). In time it may be necessary to clean vegetative growth from these ditches, but no maintenance has been necessary in the first four years since construction. Water table measurements on several of these areas in 1972 indicated no blocked drainage, and no timber damage was evident.

For pipelines constructed above ground, excavations below the pipe were used to provide the necessary cross drainage (*Figures 7* and *8*). This type of construction was first used on the Chippewa National Forest during the winter of 1972-73. The half-culvert used to line the bottom of the cross ditch should keep the ditch free of vegetation and help keep it from slumping in.

Figure 4. Relative water table elevations on upslope and downslope sides of the pipeline during 1972.



Other Considerations

Every effort is made to minimize the environmental impact of constructing pipelines on the Chippewa National Forest. A single corridor has now been established for all pipelines and other utilities rather than having separate corridors for each company. Where possible, the corridor bends at forest road crossings to shorten the line of sight.

The disturbed area is revegetated as soon as possible after construction to control erosion and improve appearance and wildlife habitat. The material covering above ground pipes is fertilized and seeded to a grass-legume mixture. Major portions of the right-of-way are allowed to revegetate naturally to native trees and shrubs for timber production and for wildlife food and cover. Other specified portions are planted with various sizes and species of trees and shrubs to diversify wildlife habitat and improve appearance.

For pipelines constructed above ground, it is necessary to excavate material parallel to the pipeline to cover the pipe. Breaks in the excavation ditch are required at 400- to 600-foot intervals to allow game and people to cross the ditch easily. Because studies have demonstrated that waterfowl use similar ditches (*9, 7*), wild rice (*Zizania aquatica*) will be seeded in the ditch areas and duck nesting boxes will be installed nearby. The results of all these techniques will be closely observed so that improved methods can be developed to further minimize the environmental impact of the pipeline.

Literature Cited

1. Boelter, D. H. 1964. Hydraulic conductivity of peats. Soil Sci. 100:227-231.
2. ———. 1966. Hydrologic characteristics of organic soils in Lake States watersheds. J. Soil and Water Conserv. 21:50-53.
3. Broadfoot, W. M. 1958. Reaction of hardwood timber to shallow water impoundments. Miss. Agr. Exp. Sta. Inform. Sheet 595. 2 pp.
4. Davis, J. R., and R. E. Lucas. 1959. Organic soils, their formation, distribution, utilization and management. Spec. Bull. 425. Mich. State Univ. Agr. Exp. Sta., East Lansing. 156 pp.
5. Green, W. E. 1947. Effect of water impoundment on tree mortality and growth. J. Forestry 45:118-120.
6. Heinselman, M. L. 1970. Landscape evolution, peatland types, and the environment in the Lake Agassiz Peatlands Natural Area, Minnesota. Ecol. Monogr. 40:235-261.
7. Hennan, E. G. 1970. Effects of level-ditching on numbers of breeding ducks in Waterhen Marsh, Saskatchewan. Thirty-second Midwest Fish and Wildlife Conf., Winnipeg, Manitoba, Dec. 6-9, 1970. 6 pp.
8. Hosner, J. F., and S. G. Boyce. 1962. Tolerance to water saturated soil of various bottomland hardwoods. Forest Sci. 8:180-186.
9. Lacy, C. H. 1959. Artificial pothole and level ditch development as a means of increasing waterfowl production. M.S. Thesis. Utah State Univ., Logan, Utah. 85 pp.
10. Stoeckeler, J. H. 1967. Wetland road crossings: drainage problems and timber damage. USDA Forest Serv. Res. Note NC-27. 4 pp. North Cent. Forest Exp. Sta., St. Paul, Minn.

Figure 5. Cross ditch above buried pipe provides adequate drainage through backfill of newly constructed pipeline.

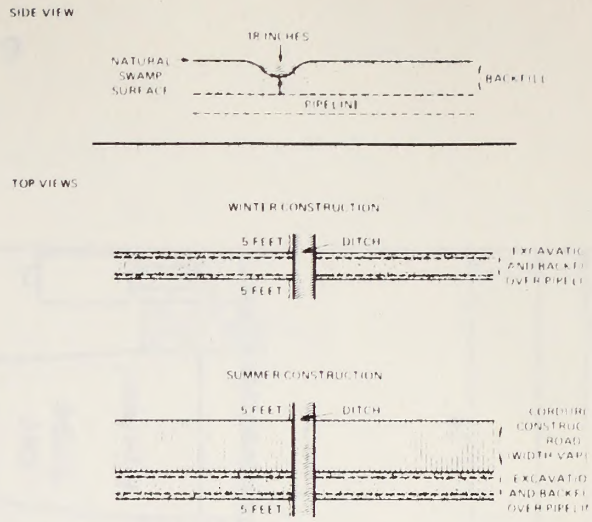


Figure 6. Details of cross ditches required by the Chippewa National Forest for wetland crossings of pipelines constructed below ground.

Figure 7. Newly constructed pipeline on the surface with ditch for cross drainage beneath the pipe.

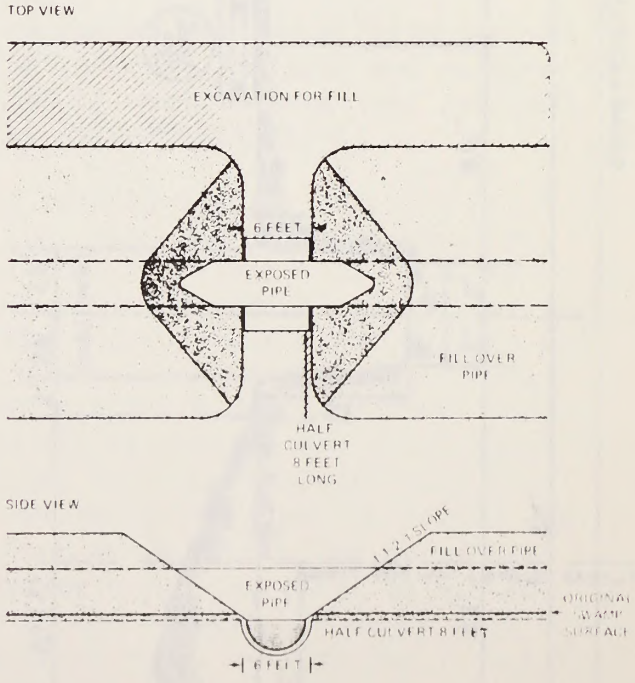


Figure 8. Details of cross ditches required by the Chippewa National Forest for wetland crossings of pipelines constructed above ground in winter.

Purchased by the Forest Service, U.S. Dept. of Agriculture for official use.

RIGHT-OF-WAY WIDTH REQUIREMENTS

36" Pipeline

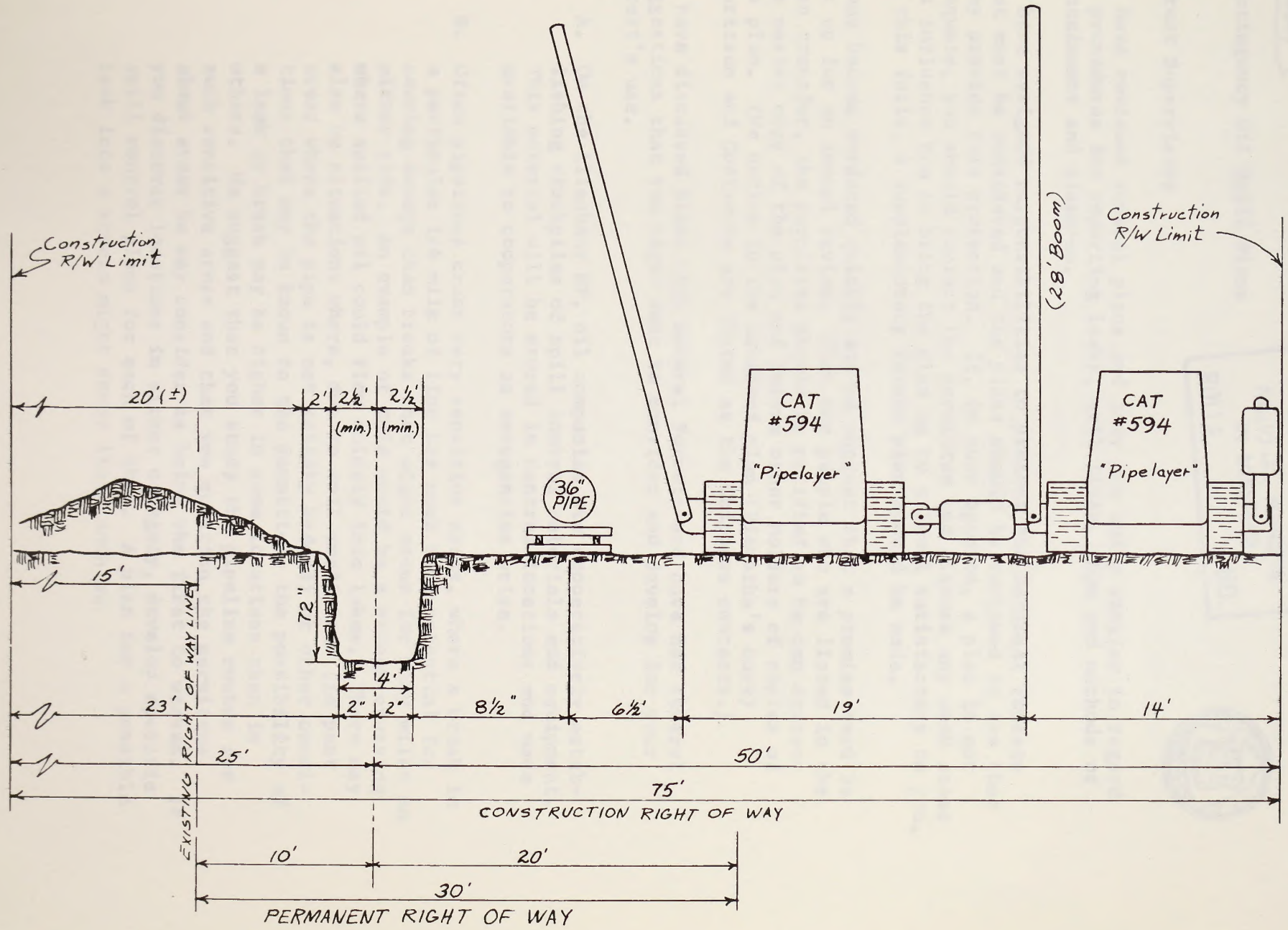


Exhibit 9

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
R-9-L

F.S. R-9
RECEIVED
DEC 9 1974
NATIONAL FORESTS
IN MISSOURI
ROLLA MO.

REPLY TO: 1590 Emergency Operations (5400)

December 3, 1974

SUBJECT: Contingency Oil Spill Plans

TO: Forest Supervisors

We have reviewed several plans and they are quite similar in regard to procedures for reporting leaks, call lists, maps and methods of containment and clean-up.

We have assigned responsibilities to protect the National Forests that must be considered and the plans should be reviewed to see that they provide this protection. If, in your opinion, a plan is not adequate, you should contact the permittee and discuss any weak areas and influence him to bring the plan up to a level satisfactory to you. If this fails, a supplementary Forest plan should be made.

Plans become outdated quickly and we suggest that a promise card be set up for an annual review. When our people who are listed in the plan transfer, the permittee should be notified so he can correct the master copy of the plan and inform other holders of copies of the plan. (We notice in the Lakehead plan (Hiawatha's copy) Lauritsen and Godlevske are listed as the Chippewa contacts.)

We have discussed plans with several Forests and have had several suggestions that you might want to consider and develop for your Forest's use.

A. On the Allegheny NF, oil companies are cooperatively establishing stockpiles of spill control materials and equipment. This material will be stored in central locations and made available to cooperators as emergencies arise.

B. Often pipelines cross very sensitive areas, where a break in a particular 1/4 mile of line has much more potential for causing damage than breaks that might occur for many miles on either side. An example of this would be a stream crossing where spilled oil could flow quickly into lakes. There may also be situations where, due to soil conditions (in peat areas where the pipe is not solidly bedded) or other conditions that may be known to the permittee, the possibility of a leak or break may be higher in some locations than in others. We suggest that you study the pipeline routes for such sensitive areas and that you question the permittee about areas he may consider as being the first to weaken. If you discover locations in either category, develop specific spill control plans for each of them. A plan for a possible leak into a stream might cover items such as:

DEC 8 1974
HAWKINS-DAVIS
IN MISSOURI
ROLLA MO.

1. Map showing all access routes to stream.

2. Most feasible location for spill control structures.

3. Determination of most effective spill containment method for this specific site.

4. Location of closest stockpile of containment material.

5. Call list of personnel that would be involved in a break at this location. (Forest, permittee, and State natural resource persons.)

C. Also, you should consider and explore the possibility of cooperative agreements with companies so that in those instances where the Forest Service might be in the best position to take initial action on a spill, there could be reimbursement for manpower and equipment.

We expect to provide additional material under this file designation on oil spills and spills of hazardous material.

If you have any comments or wish to discuss any of this material further, we will be happy to do so.

Carl N. Wilson

CARL N. WILSON
Director of Lands and
Watershed Management

Attachment #2

WORK OUTLINE FOR THE STUDY: *

A. Review the existing transportation and utility systems across Federal and intermingled private lands with major emphasis on Federal lands in the Eastern National Forests.

1. Highway Systems

a) Size (interstate and major primary)

1) Related facilities (service areas, rest areas, etc.)
2) Access to facilities (distances between interchanges)

b) Location (maps and overlays)

c) Technical, engineering and safety compatibility factors

d) Corridor relationships in existing systems (compatible users)

e) Economic factors

f) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation.

g) Institutional and legal factors

h) Impacts

1) Environmental, aesthetics, etc.
2) Social

i) Security needs (National Defense)

j) Review of abandoned highway R/W's for possible use by other R/W systems or land uses

* NOTE: Technical, engineering and safety compatibility factors and security needs will be analyzed only to the extent information becomes available. Major work effort will be placed on remaining items.

Rail Systems

a) Size (100 miles or longer)

b) Location (maps and overlays)

c) Users (power plants, refineries, defense installations, etc.)

d) Technical, engineering, and safety compatibility factors

e) Corridor relationships in existing systems (compatible users)

f) Economic factors

g) Institutional and legal factors

h) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

i) Impacts

   1) Environmental, aesthetics, etc
   2) Social

j) Security needs (National Defense)

k) Review of possible abandoned railroad R/W's for possible use by other R/W systems or land uses.

Power Transmission Line System

a) Transmission line size (115 KV and larger)

   1) Related facilities
   2) Access to lines and related facilities
   3) Type of system (overhead, buried, etc.)

b) Location (maps and overlays)

c) Technical, engineering, and safety compatibility factors

   1) Reliability

d) Corridor relationships in existing systems (compatible users)

e) Economic factors

f) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

g) Institutional and legal factors

h) Power source (generating plants)

i) User load centers

j) Energy sources for generating plants (coal fields, water supplies, etc.)

k) Impacts

1) Environmental, aesthetics, etc.
2) Social
3)(a) Any resulting population growth or development as a result of development of these resources.

l) Security needs (National Defense)

4. Major Communication Systems

a) Size (100 miles or more in length)

1) Type (buried cable, overhead, etc.)
2) Access and related facilities

b) Location (maps and overlays)

c) Technical, engineering, and safety compatibility factors

d) Corridor relationships in existing systems (compatible users)

e) Economic factors

f) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation.

g) Institutional and legal factors

h) Impacts

1) Environmental, aesthetics, etc.
2) Social

i) Security needs (National Defense)

5. Pipeline Systems

a) Pipeline size (usually 16" and larger, but smaller, if they meet intent of study)

1) Related facilities (pumping stations, refineries, etc.
2) Access to lines and related facilities
3) Type (buried or above ground)

b) Location (maps or overlays)

c) Location of source of products (compressor stations, oil fields, refineries, coal fields, hydrosites)

d) User source or distribution stations (refineries, power plants, storage facilities consumers)

e) Technical, engineering,and safety compatibility factors

f) Corridor relationships in existing systems (compatible users)

g) Economic factors

h) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

i) Institutional and legal factors

j) Impacts

1) Environmental
2) Social

k) Security needs (National Defense)

6. Other Systems (canals, etc.)

a) Size

1) Access needs

b) Location (maps and overlays)

c) Users

d) Technical, engineering, and safety compatibility factors

e) Corridor relationships in existing systems (compatible users)

f) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

g) Institutional and legal factors

h) Impacts

1) Environmental, aesthetics, etc.
2) Social

B. Identify projected demands for transportation and utility systems on Federal and private lands with emphasis on Federal lands in the Eastern National Forests.

1. Highway System

a) Size (Interstate and primary intrastate)

1) Access needs to facilities
2) Type

b) Location (maps and overlays)

c) Users

d) Technical, engineering and safety compatibility factors

e) Corridor relationship to existing systems (compatible users)

f) Economic impacts expected

g) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

h) Institutional and legal factors

i) Impacts expected

1) Environmental, aesthetics, etc.
2) Social

j) Security needs (National Defense)

2. Rail Systems

a) Size (10 miles or longer)

1) Access and related facility needs
2) Type (unit trains, etc.)

b) Location

c) Users

d) Technical, engineering and safety compatibility factors

e) Corridor relationship to existing systems (compatible users)

f) Economic impacts expected

g) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

h) Institutional and legal factors

i) Impacts expected

1) Environmental, aesthetics, etc.
2) Social

j) Security needs (National Defense)

3. Power Transmission Line Systems

a) Transmission line size (230 KV and larger)

1. Access to facilities
2. Type (overhead or buried)

b) Location of power source (generating plants)

c) User source (load centers - geographic locations)

d) Energy sources for generating plants (including water)

e) Technical, engineering and safety compatibility factors

f) Corridor relationship to existing systems (compatible users)

g) Economic impacts expected

h) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

i) Institutional and legal factors

j) Impacts expected

1) Environmental, aesthetics, etc.
2) Social

k) Security needs (National Defense)

4. Major Communication Systems

a) Size

1) Type
2) Access needs

b) Location (maps and overlays)

1) Origination and destination of system

c) Technical, engineering and safety compatibility factors

d) Corridor relationship to existing systems (compatible users)

e) Economic impacts expected

f) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

g) Institutional and legal factors

h) Impacts expected

1) Environmental, aesthetics, etc.
2) Social

i) Security needs (National Defense)

5. Pipeline Systems

a) Pipeline size (24" or larger)

1) Related facilities (pumping stations, refineries, etc.)
2) Access needs to lines and facilities

b) Location (maps and overlays)

c) Location of source of products

d) User source or distribution stations

e) Technical, engineering and safety compatibility factors

f) Corridor relationship to existing systems (compatible users)

g) Economic impacts expected

h) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

i) Institutional and legal factors

j) Impacts expected

1) Environmental, aesthetics. etc.
2) Social

k) Security needs (National Defense)

6. Other Systems (canals, etc.)

a) Size

1) Access needs

b) Location

c) Users

d) Technical, engineering and safety compatibility factors

e) Corridor relationship to existing systems (compatible users)

f) Economic impacts expected

g) Evaluation in relationship to Federal and State land use planning and applicable policies, regulations and legislation

h) Institutional and legal factors

i) Impacts expected

1) Environmental, aesthetics, etc.
2) Social

C. National transportation and utility systems corridor feasibility analysis

1. Compatibility of the systems in:

a) Single system corridor (single type of system with one or more R/W's within each corridor)

(1) Advantages or disadvantages of shared single system rights-of-way

(a) Technical, institutional and legal factors

(b) Safety and reliability factors

(c) Economic factors

(1)(a) Effect of corridor "establishment" on property rights and values

(d) Existing Federal and State land use planning and applicable policies, regulations and legislation

(e) Environmental factors

(1)(a) Aesthetics, etc.

(f) Social factors

(g) Security needs (National Defense)

b) Multisystem corridors

(1) Advantages or disadvantages of multisystem right-of-way

(a) Technical, institutional and legal factors

c) Economic impacts expected

g) Evaluation on existing ship or industry and long-term planning and application of existing regulations and legislation

h) Inter-national and local factors

i) Impacts expected

j) Environmental, aesthetic, etc.
k) Social

6. Alternative transportation and utility systems circulation estimate-utility analysis

i. Compatibility of the systems:

a) Single system corridor (single line of system with one or more R/W's within each corridor)

(1) Advantages or disadvantages of single Large System right-of-way

(a) Technical, institutional and local factors

(b) Safety and reliability factors

(c) Economic factors

(d)(a) Effect of corridor "saturation" on property rights and values

(b) Existing federal and state land use planning and zoning policies, regulations and legislation

(c) Environmental factors

(d)(a) Aesthetics, etc.

(e) Social factors

(f) Security needs (National Defense)

b) Multiple-use corridors

(1) Advantages or disadvantages of multiple-use right-of-way

(a) Technical, institutional and local factors

b) Safety and reliability factors

c) Economic factors

(1)(a) Effect of corridor "establishment" on property rights and values

d) Existing Federal and State land use planning and applicable policies, regulations and legislation

e) Environmental factors

(1)(a) Aesthetics, etc.

f) Social factors

g) Security needs (National Defense)

D. Conclusions

1. Single system corridors (single type of system with one or more R/W's within each corridor)

2. Multisystem corridors

3. Other alternatives

4. Limitations to 1, 2 and 3 above

a) Technical, institutional and legal factors

b) Economic factors

c) Federal and State land use planning and applicable policies, regulations and legislation

d) Safety and reliability factors

e) Environmental factors

f) Social factors

g) Security needs (National Defense requirements)

E. Recommendations as to the need and feasibility for a National system of transportation and utility corridors across Eastern National Forests.

b) Safety and reliability factors

c) Economic factors

(1)(a) Effect of entrepreneurial liens and on property rights and value.

d) Existing federal and State land use planning and applicable policies, regulations and legislation

e) Environmental factors

(1)(a) Aesthetics, etc.

f) Social factors

g) Security needs (National Defense)

D. Conclusions

1. Single system corridors (single type of system with one or more lines within one corridor)

2. Multiple corridors

3. Other alternatives

4. Limitations to 1, 2 and 3 above

a) Technical, institutional and legal factors

b) Economic factors

c) Federal and State land use planning and applicable policies, regulations and legislation

d) Safety and reliability factors

e) Environmental factors

f) Social factors

g) Security needs (National Defense requirements)

E. Recommendations to Federal and State Agency for a National system of transportation and utility corridors across Eastern National Forest

EXHIBIT 12

Statement of Gerald J. McClenden

Dean of School, Environmental Design

Louisiana State University

Baton Rouge, LA

"The suggestion has been made on many occasions for the creation of utility corridors for several energy systems, of one type or different utilities and transportation systems or groups following the same path. The concept is admirable but many questions have to be answered before it can become a practical reality. One must consider the compatibility of co-existence between utility, between gas and electricity for instance. Here we encounter the problems of the desire of gas lines to wiggle its way through the country side while transmission lines must go straight to avoid the forest with conflicting demands for space for safe and speedy maintenance.

In any event, the establishment of utility corridors in rural areas must wait for another time when a super utility planning agency will reconcile conflicting interests involved."

Environmental Analysis Report
New Madrid to Franks, Missouri
345 KV line
Federated Electric Cooperation, Inc.

Exhibit 13

Six Pages

U.S.D.A. FOREST SERVICE ENVIRONMENTAL ANALYSIS REPORT

MISSISSIPPI RIVER TRANSMISSION CORPORATION
26-INCH PIPELINE

EASTERN REGION

NATIONAL FORESTS IN MISSOURI

FREDERICKTOWN RANGER DISTRICT

MADISON COUNTY
MISSOURI

JANUARY 1975

U.S.D.A. FOREST SERVICE ENVIRONMENTAL ANALYSIS REPORT
MISSISSIPPI RIVER TRANSMISSION CORPORATION
26-INCH PIPELINE
ON THE FREDERICKTOWN RANGER DISTRICT

SUMMARY SHEET

JANUARY 1975

I. TYPE OF ACTION - Administrative (X) Legislative ( )

II. DESCRIPTION - A report on a proposal to use a portion of the Fredericktown Ranger District to construct and maintain a 26-inch natural gas pipeline.

III. ENVIRONMENTAL IMPACTS - Impacts are minimal and temporary.

I. DESCRIPTION

The Mississippi River Transmission Company, a natural gas pipeline company hereinafter called MRTC, has submitted a request for a pipeline right-of-way on which they plan to construct and maintain a 26-inch natural gas pipeline, reference MRTC 11-7-74 letter attached and called Exhibit A.

The proposed right-of-way traverses national forest land on the Fredericktown Ranger District as shown on the attached vicinity map labeled Exhibit B. The legal description of the tracts traversed, from south to north, is:

1) Manewal, Amalia, S-505, 4-29-36, E½W½SW¼, Section 20, T32N, R7E.
2) LaBrot, Truman A., SF-697, 10-24-68, E½SW¼, NW¼SE¼, W½W½NE¼, Section 17, T32N, R7E; and W½SW¼SE¼, Section 8, T32N, R7E.
3) Sweetwater Mining Co., S-532, 5-28-36, W½NW¼SE¼, Section 8, T32N, R7E, also shown on the attached Clark National Forest photo map called Exhibit C.

The right-of-way requested parallels existing rights-of-way granted to MRTC prior to our acquisition of the lands involved. Widths of these prior rights vary and in some cases the land used is in excess of the width granted. A summary of these rights-of-way follows:

1) Manewal, Amalia - undefined centerline, 16.5 foot width.
2) LaBrot, Truman A. - surveyed centerline, 75 foot width.
3) Sweetwater Mining Company - surveyed centerline, width not specified.

Copies of these right-of-way instruments can be found in the appendix as Exhibits G, H, and I. The inconsistancy in these rights-of-way with respect to land being used in relation to width granted, has been negotiated with MRTC and agreement reached as to necessary curative action. This action will be to amend MRTC's existing special use permit to allow a uniform 75 foot right-of-way over the national forest land involved. This action is not a part of this transaction but an explanation is necessary in order to explain the difference between the right-of-way width requested and that being proposed.

The proposed right-of-way centerline will be 50 feet west of and parallel to the centerline of the existing MRTC right-of-way and traverse national forest land for a total distance of 10,089 feet or 1.91 miles.

Width of the proposed right-of-way will be 37.5 feet, 25 feet west of centerline and 12.5 feet east. This width differs from that requested as is explained above and graphically in Exhibit J.

Total area covered by right-of-way is 8.68 acres.

II. ENVIRONMENTAL IMPACTS

The Fredericktown Ranger District is oriented predominantly in an east-west direction between the city of St. Louis and points south. As a result, use patterns between the St. Louis metropolitan area and points south have crossed the District. As can be seen in Exhibit C, these various uses have developed along a definite pattern that has, in effect, become a use corridor encompassing a major U. S. Highway, county roads, three pipelines, a power line and a telephone line.

Since the corridor is not overly congested, the inclusion of the proposed pipeline will be of minimal over all impact.

The environmental impact of this proposal is spoken to in the attached report prepared by Ryckman/Edgerley/Tomlinson & Associates, Inc. (RETA) entitled Environmental Assessment Statement, September 12, 1974, called Exhibit K.

III. FAVORABLE ENVIRONMENTAL EFFECTS

Granted, a project such as this has an effect on environmental quality but it is essential to our present society and therefore environment concessions must be made. The question then becomes how much is acceptable and where will it be acceptable?

The pipeline in it's proposed location is the best compromise in that it preserves unimpacted public lands from further impact by being in a location where this type of use is acceptable and the public need is satisfied.

IV. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Reference the RETA Report, Exhibit K.

We have reviewed this report and feel it is sufficient.

V. ALTERNATIVES TO THE PROPOSED ACTION

There are three alternatives that can be considered in this request:

1) Deny request.
2) Develop alternative route.
3) Process application with modification as necessary to ensure environmental compatibility.

To deny an application for a natural gas pipeline that is an expansion of the only source of natural gas supply for the St. Louis metropolitan area in this time of fuel crisis would be totally unacceptable.

Alternative routings analyzed would be unreasonable as they would result in significant detours from the logical routing when considering the already established sections of this line. They would necessitate using more national forest land and also require construction of new access routes to the line.

Since the proposed location is in an established use corridor, the additional environmental impact is minimized as are all other resource impacts: access is established, already cleared land is used to a maximum, timber loss is minimal, and visual impact consistent with surroundings. In short, this is the only logical and viable alternative.

VI. RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The short term effects of this project will be little noticed and are insignificant when compared with the long-term social benefits to be derived in the St. Louis metropolitan area.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There are no irreversible or irretrievable commitment of resources involved with this project.

VIII. CONSULTATION WITH OTHERS

1) U.S.A. Federal Power Commission - see Exhibit L.
2) Environmental Protection Agency - EPA contacted Ranger Kline with respect to the pipeline crossing of Twelve Mile Creek.
3) U.S. Forest Service - NFIM - C. P. Tryon - with respect to crossing Twelve Mile Creek.

V. ALTERNATIVES TO THE PROPOSED ACTION

There are three alternatives that can be considered in this request:

1) Deny request.
2) Develop alternative route.
3) Process application with modification as necessary to secure environmental compatibility.

To deny an application for a natural gas pipeline that is an expansion of the only source of natural gas supply for the St. Louis metropolitan area in this time of fuel crisis would be totally unacceptable.

Alternative routings analyzed would be unreasonable as they would result in significant detours from the logical routing when considering the already established sections of this line. They would necessitate being more national impact issues and also require construction of new access routes to the line.

Since the proposed location is in an established use corridor, the additional environmental impact is minimized and are all other resource impacts. Access is established, already cleared land is used to a maximum, other lines is minimal, and minimal impact correlated with surroundings. In short, this is the only logical and viable alternative.

VI. RELATIONSHIP BETWEEN SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The short-term effects of this project will be of the moderate and are insignificant when compared with the long-term social benefits to be derived in the St. Louis metropolitan area.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There are no irreversible or irretrievable commitment of resources involved with this project.

VIII. CONSULTATION WITH OTHERS

1) U.S.A., Federal Power Commission - [illegible]
2) Environmental Protection Agency - [illegible] Manager [illegible] with respect to the pipeline crossing of Twelve Mile Creek.
3) [illegible] - [illegible] - [illegible] - [illegible] to [illegible] Mile Creek.

IX. MANAGEMENT REQUIREMENTS AND CONSTRAINTS

MRTC's current special use permit, dated 6-7-71, which this proposal would become an amendment to, will provide adequate control. Copy of this permit is attached as Exhibit M.

X. SIGNIFICANT ENVIRONMENTAL IMPACTS Yes ( ) No (X)

Based upon review of the proposed action, it is recommended that an environmental statement is not necessary.

XI. RECOMMENDATIONS

It is recommended that the existing MRTC special use permit, dated 6-7-71, for a section of this same line, but on the Poplar Bluff Ranger District be amended to include 10,089 feet of right-of-way which is 37.5 feet wide.

REPORT PREPARED BY:

L. Stanley Freese Jr. — January 23, 1975

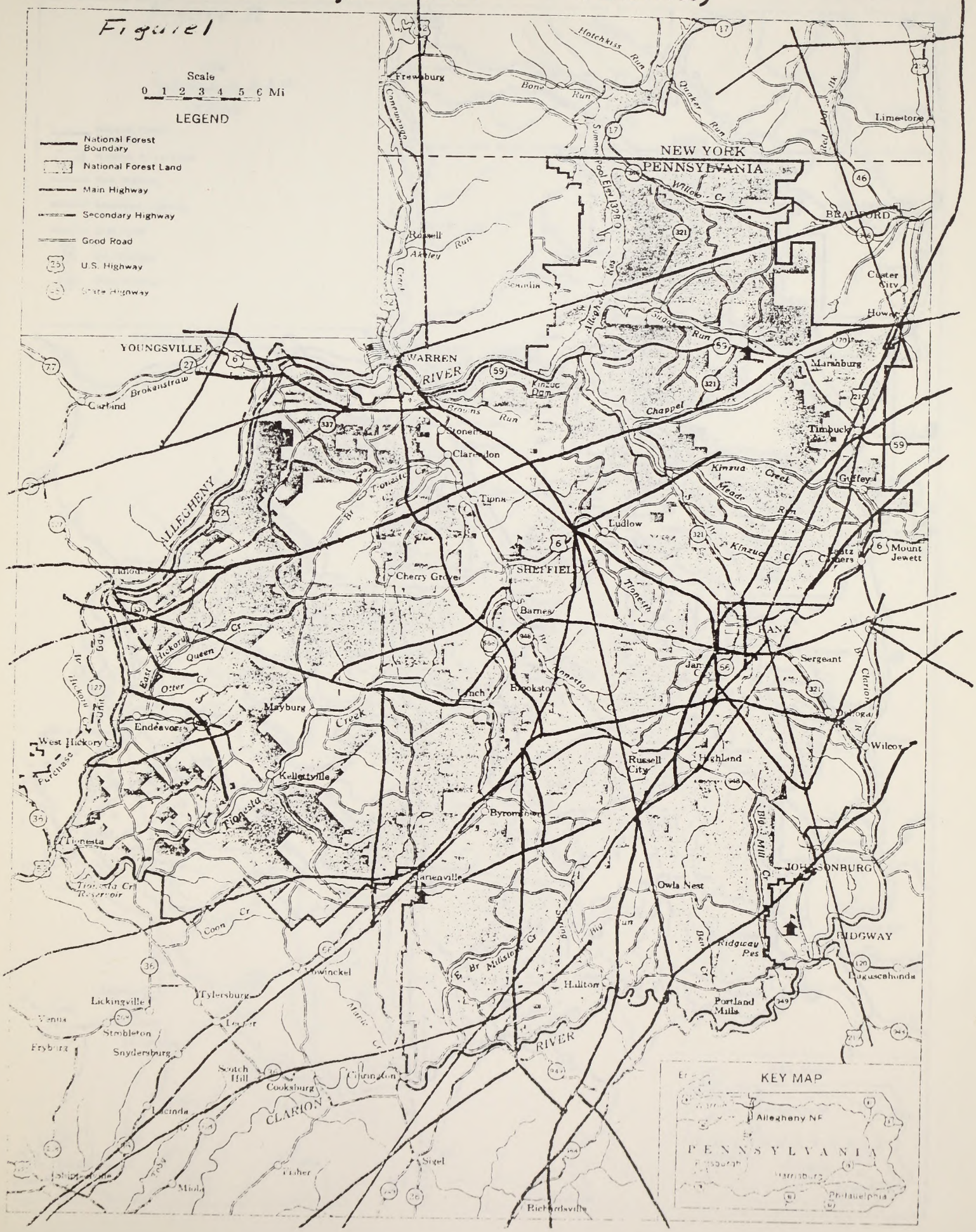
L. STANLEY FREESE, JR. (DATE)
Land Uses Staff Officer

REPORT RECOMMENDED BY:

for Leon C. Kridelbaugh — 1/23/75

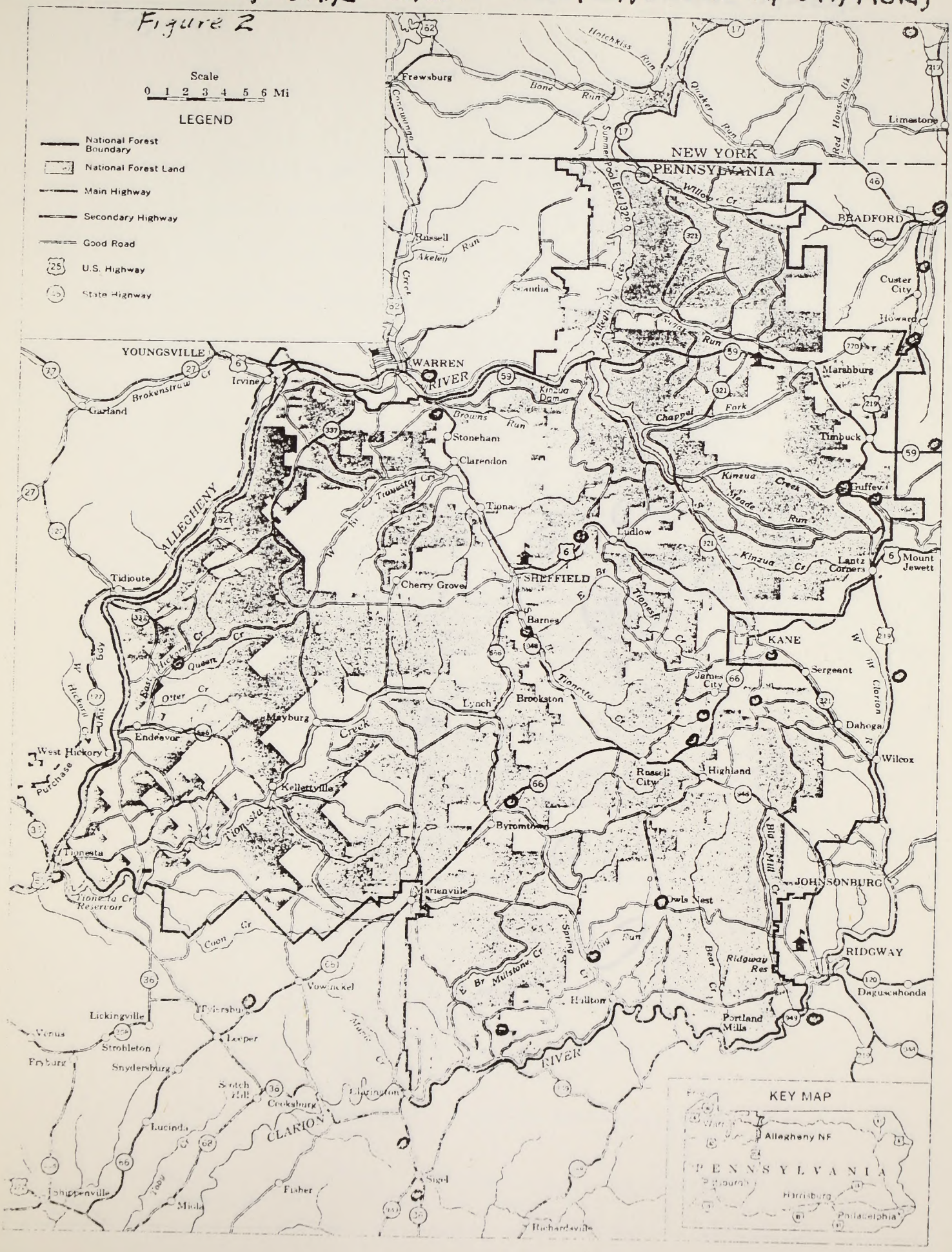
DONALD L. ROLLENS (DATE)
Forest Supervisor

ALLEGHENY NATIONAL FOREST - PIPELINES



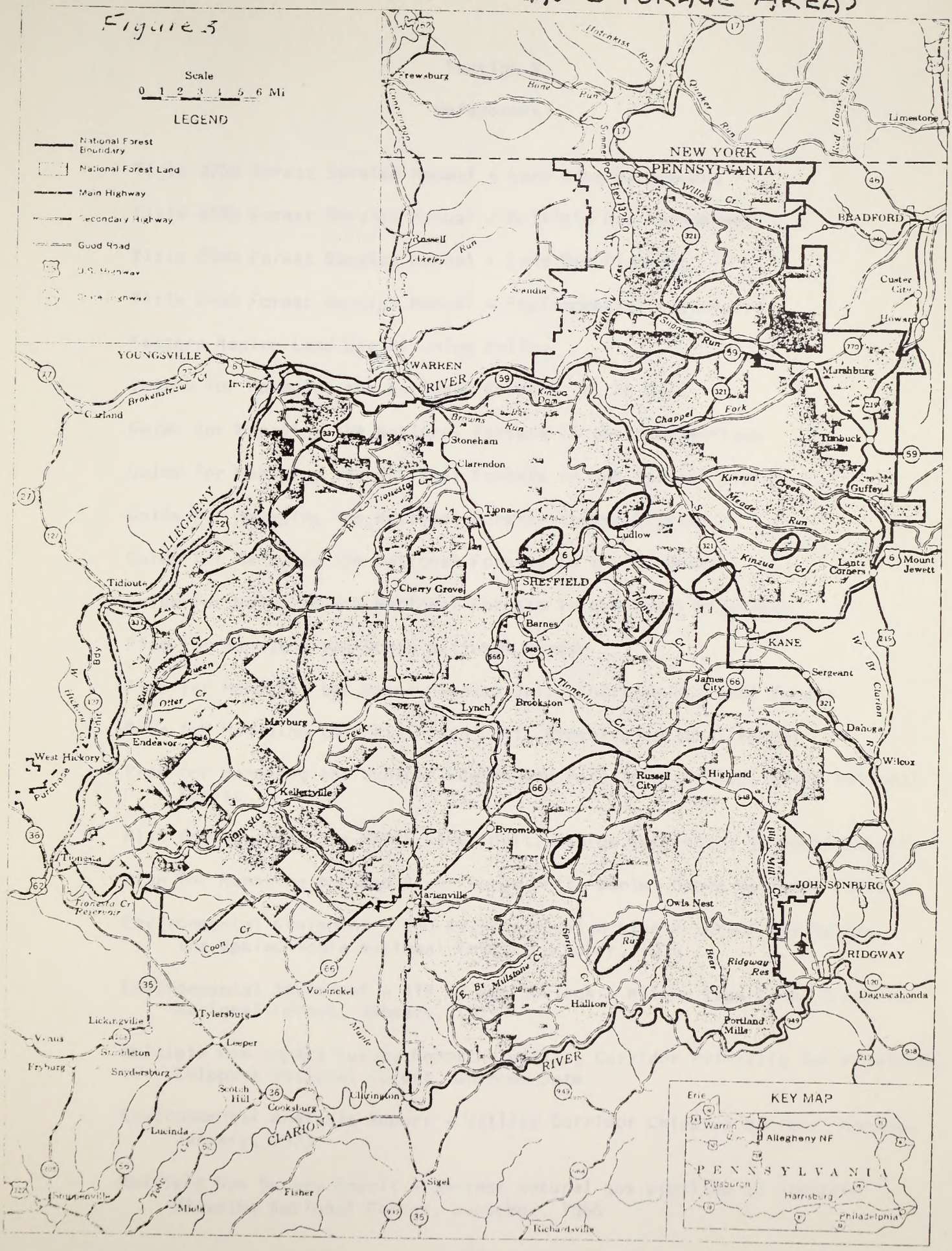
ALLEGHENY NATIONAL FOREST - OIL & GAS PUMPING STATIONS

Figure 2



ALLEGHENY NATIONAL FOREST - GAS STORAGE AREAS

Figure 3



Section V

References

Title 2700 Forest Service Manual - Land Uses Management

Title 2100 Forest Service Manual - Multiple Use Management

Title 8200 Forest Service Manual - Land Use Planning

Title 8400 Forest Service Manual - Environmental Statements

Eastern Region Land Use Planning Policy

System for Managing the National Forests in the East

Guide for Managing the National Forests in the Appalachians

Guide for Managing the National Forests in the Coastal Plains

Guide for Managing the National Forests in New England

Guide for Managing the National Forests in the Piedmont

Guide for Managing the National Forests in the Ozark Highlands

Plan for Managing the Ocala National Forest

Plan for Managing the Upper Hiwasee Unit, Cherokee National Forest

Plan for Managing the Petit-Jean Unit, Ouachita National Forest

Plan for Managing the Juniper-Hughes and Pats Island Units, Ocala National Forest

Plan for Managing the North River Unit, George Washington National Forest

Plan for Managing the Red River Gorge Unit, Daniel Boone National Forest

Environmental Statement - 230 KV Transmission Line Right-of-Way Across the Apalachicola National Forest, October, 1974

Environmental Statement - 115 KV Hot Springs - Milton Tape Line, Ouachita National Forest, January, 1975

Multiple Use Impact Survey Report - Utility Corridor Primarily for Pipelines, Chippewa National Forest, Unknown Date

Environmental Analysis Report - Utility Corridor Chippewa National Forest, January, 1973

Multiple Use Survey Report - 36-inch natural gas pipeline (3 reports) Hiawatha National Forest, November, 1966

Impact Survey Report - Arkansas-Missouri Power Company, Viburnum to Fletcher Mine, Clark National Forest

Curtis, E. J. Counseling With Caution in Administration Acquired Eastern National Forest Lands Since NEPA Land and Water Review, University of Wyoming

National Forest System, Areas of June 30, 1973. U. S. Department of Agriculture, Forest Service

Form 1279-3
(June 1984)

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Transportation
corridor fea

DATE LOANED	BORROWER

USDI – BLM